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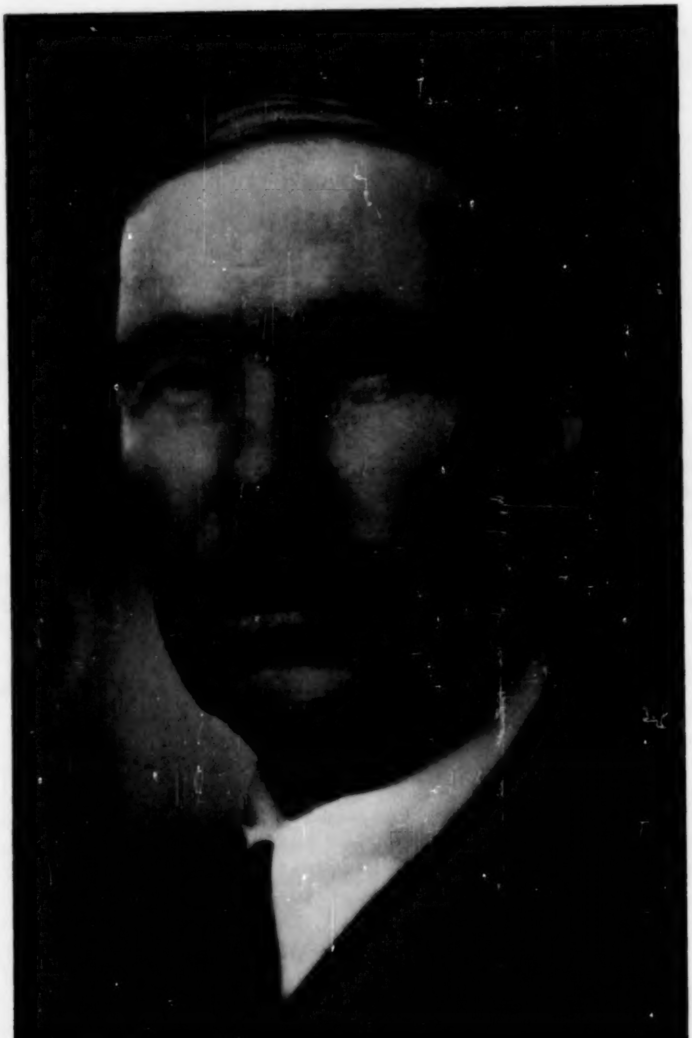
OTHER DEPARTMENTS

EDWARD ALSWORTH ROSS

Secretary of the American Economic Association, 1893

Edward Alsworth Ross was born at Virden, Illinois, on December 12, 1866. He died at Madison, Wisconsin, July 22, 1951. He was left an orphan at the age of eight. At fifteen, he entered the preparatory school of Coe College, Cedar Rapids, Iowa; was graduated from this College in 1886 (LL.D., 1911). After teaching school for two years, he went to Germany, spending a year at the University of Berlin. His next three years were spent at Johns Hopkins University, where he received his Ph.D. degree, with a major in economics and minors in philosophy and ethics. Thereafter he became a member of the faculty of Indiana University for a year; then another year at Cornell University; then seven years at Stanford. This was followed with a five-year professorship at the University of Nebraska. From there he was called to the University of Wisconsin in 1906, where he stayed until his retirement in 1937. It was here that he wrote most of his books and articles on sociology and became recognized as one of the pioneers in that field. He was one of the four sociologists to be elected for two successive terms as president of the American Sociological Society, 1914-15. Ross was elected Secretary at the annual meeting held August 23-26, 1892, at Chautauqua, New York. He was elected to succeed Richard T. Ely, who was at that time moving to the University of Wisconsin and who had delegated most of the secretarial work to Frederick C. Howe, acting as Assistant Secretary. Ross had moved from Johns Hopkins University to Cornell. In September, 1893, he wrote to Jeremiah W. Jenks from Stanford University that, owing to illness, he was not able to formulate his Secretary's report and that he "was only too anxious to get rid of the burden of duties and responsibilities which though not heavy in themselves felt rather heavy to [him] then."



E. A. Ross

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FINANCIAL ASPECTS OF ECONOMIC DEVELOPMENT

By John G. Gurley and E. S. Shaw*

Economic development is commonly discussed in terms of wealth, the labor force, output, and income. These real or "goods" aspects of development have been the center of attention in economic literature to the comparative neglect of financial aspects. Yet development is associated with debt issue at some points in the economic system and corresponding accretions of financial assets elsewhere. It is accompanied, too, by the "institutionalization of saving and investment" that diversifies channels for the flow of loanable funds and multiplies varieties of financial claims. Development also implies, as cause or effect, change in market prices of financial claims and in other terms of trading in loanable funds. Development involves finance as well as goods.

In the first section below we review briefly the financial manifestations of income generation, spending and saving, investment, and the accumulation of wealth. The second section is concerned with the role of financial institutions or intermediaries in transmitting loanable funds between spending units. The third section suggests that conventional theories of income, interest, and money have given insufficient attention to important reciprocal relationships between real development and financial development, and proposes some theoretical adaptations. The final section is concerned with illustrative implications of our analysis for some aspects, especially the monetary, of economic policy and regulatory techniques.

I. *Finance in the Social Accounts*

Analysis of economic change and development has customarily relied on an abbreviated set of social accounts. This set of accounts reports

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the net worth items of income, consumption, and saving as well as the asset item of investment or wealth accumulation. The accounts omit the financial side of change and development, that is the accumulation of debt and financial assets in their various forms. They are not a complete social balance sheet. One result is that financial analysis, left to its own devices, has been difficult to coordinate with analysis "on the side of goods." Another result, we suspect, is an inadvertent undervaluation by economists of the role that finance plays in determining the pace and pattern of growth.

A. *Deficits, Surpluses, and Balanced Budgets.* It is not difficult, in principle, to design a set of social accounts that does incorporate finance. Final buyers of output, or spending units, may be divided into three groups:

Spending units with *balanced budgets* keep their spending—on consumption, investment, or government goods and services—precisely in balance with income. If they save, they invest a like amount, so that their financial assets do not change relative to outstanding debt including equity claims other than earned surplus.[1] Spending units with *surplus budgets* have an excess of income over spending on goods and services. If they save, their saving exceeds their own investment, so that their financial position improves. Their financial assets increase more or decrease less than their liabilities, and they are thereby suppliers of loanable funds. Spending units with *deficit budgets* permit spending to exceed income.[2] They demand loanable funds, releasing financial assets or issuing debt, so that their financial assets decline relative to the sum of their liabilities and equity other than earned surplus. A complete set of social accounts would report the flows of loanable funds between spending units and the corresponding changes in financial status.[3]

There are financial corollaries following from the *ex-post* identity of receipts and expenditures, of saving and investment, and of surpluses and deficits for the aggregate of spending units. First, loanable funds supplied equal loanable funds acquired. Second, the increase of net

[1] By "debt" and "liability" we mean both the creditor claims and the equity claims that are instrumentalities of external financing.

[2] In 1939 Walter S. Salant proposed that spending units be classified as we propose, so that real change could be explicitly related to financial change. National Bureau of Economic Research, *Studies in Income and Wealth,* Vol. III (New York, 1939), pp. 305-11. Mr. Salant has been most helpful in discussions of this article, but no guilt attaches to him for the consequences.

[3] It may be helpful if our definitions are put more succinctly. Let R be receipts on income account, E expenditures on income account, D any increment in debt, and FA any increment in financial assets. Subscripts b, s, and d refer to type of spending unit (balanced-budget, surplus-budget, and deficit-budget). Then, for any spending unit:

$$E - R = D - FA$$

financial assets for surplus spending units equals the increase of net financial liabilities for deficit spending units. The rise of income and the accumulation of wealth are one aspect of growth: the corollary, where budgets are unbalanced, is the accumulation of debt and financial assets.[4]

An *ex-ante* balance between income and spending, saving and investment, and surpluses and deficits implies *ex-ante* balance between offers of and bids for loanable funds, offers of and bids for financial assets, willingness to incur debt and willingness to hold debt instruments. An equilibrium level of income and wealth is associated with an equilibrium level of debt and its counterpart in financial assets.

B. *Relative Change in Debt, Income, and Wealth.* Accumulation of debt is part of the growth process, but the rate of accumulation is not related by a simple constant to the rise of wealth and income.[5] The proportion of the stock of debt to a community's income appears to depend on three complex factors: (1) the ratio of borrowing to deficits; (2) the ratio of deficits to income; (3) and the rate of change in income. To the degree that the income-wealth ratio is stable, the proportion of the stock of debt to community wealth depends on these same factors. Any variation in the income-wealth ratio becomes a fourth factor affecting the debt-wealth relationship.

The ratio of borrowing to deficits is affected by the manner in which deficits are financed, as we shall see in the next section. It is affected, too, by the desire of spending units to incur debt for other purposes than finance of deficits. These purposes may include acquisition of claims on banks and other financial intermediaries, of claims that give managerial control over other spending units, or of claims that have speculative interest.

The ratio of deficits to income depends in part on such institutional factors as the chronic concentration of investment in some sectors, say

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Spending units may be classified as follows:

Balanced-budget	$D_b = FA_b$
Surplus-budget	$D_s < FA_s$
Deficit-budget	$D_d > FA_d$

The flow of loanable funds is $FA_s - D_s = D_d - FA_d$

[4] We neglect various complexities in accounting for finance. For example, we overlook nonuniformity in accounting practices and the resulting imbalance between the records of debtors and creditors. We omit, too, the possibility of transfers of existing real assets, rather than securities, between deficit spending units and surplus spending units.

[5] A particularly helpful discussion of wealth-debt relationships may be found in R. W. Goldsmith, *Financial Structure and Economic Growth in "Advanced" Countries,* (mimeo.), a paper presented to the Conference on Capital Formation and Economic Growth, National Bureau of Economic Research (New York, 1953).

the corporate, and of saving in others, such as the personal sector. Institutional or technical factors that alter the division of labor between savers and investors must affect the proportion of debt to income and wealth. The ratio of deficits to income evidently depends, too, on disturbances in the propensity to spend, by spending units with access to borrowing facilities, on goods regarded by creditors as a suitable basis for lending.

However stable may be the proportion of borrowing to income in any period, the proportion of accumulated debt to income depends on how rapidly income is growing. It is relatively low if income is gaining swiftly, high if income growth is sluggish. The stock of debt changes slowly enough so that variations in the growth rate of income can significantly affect the debt-income relationship.

Whatever the ratio of debt to income, the ratio of debt to wealth reflects variations in the income-wealth ratio. These variations may occur for any of several reasons. For example, income and debt may rise on a wave of spending that does not result forthwith in capital formation.[6] Again, technological factors may alter the capital coefficient at full employment of productive capacity. Or, because of variations in effective demand, productive capacity may be exploited more or less intensively.

II. *Finance and Financial Intermediaries*

A. *Self-Finance, Direct Finance, and Indirect Finance.* Expenditure is self-financed by spending units with balanced budgets. Their consumption is financed from income, their investment from internal savings. If their financial assets and debt do change, the changes are equal. Self-finance continues to be important in the most sophisticated economic system, say in the form of investment out of retained corporate earnings. But over the very long term, the trend has been away from self-finance. Government, business, and consumers alike have come to lean more heavily on external finance.

External finance may take either of two forms, direct finance or indirect finance. Direct finance involves borrowing by deficit spending units from surplus spending units. The former issue debt of their own, *direct* debt. The latter buy and hold financial assets in the form of these direct securities. If spending on capital formation is directly financed, debt tends to accumulate *pari passu* with wealth.

Economic development is retarded if only self-finance and direct

[6] Debt to finance exhaustive spending is sometimes called "dead-weight" debt. We have avoided this term because it suggests, improperly in our view, that such debt is necessarily obstructive in the growth process in contrast with debt that finances expansion of productive capacity.

finance are accessible, if financial intermediaries do not evolve. The primary function of intermediaries is to issue debt of their own, *indirect* debt, in soliciting loanable funds from surplus spending units, and to allocate these loanable funds among deficit units whose direct debt they absorb.

When intermediaries intervene in the flow of loanable funds, the accumulation of financial assets by surplus spending units continues to equal the accumulation of debt by deficit units. The rise of intermediaries—of institutional savers and investors—does not affect at all the basic equalities in a complete social accounting system between budgetary deficits and surpluses, purchases and sales of loanable funds, or accumulation of financial assets and debt. But total debt, including both the direct debt that intermediaries buy and the indirect debt of their own that they issue, rises at a faster pace relative to income and wealth than when finance is either direct or arranged internally. Institutionalization of saving and investment quickens the growth rate of debt relative to the growth rates of income and wealth.[7]

B. *Commercial Banks and Competitive Intermediaries.* A monetary system, and especially its commercial banking component, has commonly been the first significant financial intermediary to complicate the simplicity of self-finance and direct finance. Even as late as a half-century ago in this country, the commercial banks offered the predominant escape from self-finance and direct finance.

The role of the banks has been, first, to borrow loanable funds from spending units with surpluses, issuing indirect securities in exchange. These securities have been the currency and deposits that spending

[7] In terms of definitions in note 3 above: Total expenditures (E) = Total finance $(R + D - FA)$. Then self-finance is $R - FA$ and external finance is D, which may be rewritten as D^p to distinguish the debt of spending units from D^i, the debt, aside from equity claims, of financial intermediaries. D^p is direct debt, while D^i is indirect debt. Financial assets, too, may be classified into FA^p, balances in the form of direct debt issued by other spending units, and FA^i or balances in the form of nonequity claims on financial intermediaries. Assuming that no borrowing is done simply to finance accumulation of financial assets, we may describe direct finance in this fashion:

For surplus units	FA_s^p = budget surplus
For deficit units	D_d^p = budget deficit
For all units combined	$FA_s^p = D_d^p$ = budget deficit

And the description of indirect finance is:

For surplus units	FA_s^i = budget surplus
For deficit units	D_d^p = budget deficit
For financial intermediaries	$FA_f^p = D_f^i$
For all units combined	$D_d^p + D_f^i = FA_f^p + FA_s^i = 2$ (budget deficit)

In the latter case, total debt rises twice as rapidly as cumulative deficits or surpluses. This case, of course, is a very simple one, and the multiplicative factor of 2 is only illustrative.

units would prefer over real assets or the direct security issues of ultimate borrowers. The role of the banks has been, second, to transmit the borrowed funds to spending units with deficits, receiving in exchange direct securities for their own portfolios. Finally, the banks have exchanged direct securities with spending units that wish to adjust their relative holdings of securities in direct and indirect form.

When banks are the only intermediary, surplus spending units may choose to accumulate real wealth, direct securities, or deposits and currency. Deficit spending units may finance themselves by retained earnings, by issues of direct securities to surplus units, or by issues of direct securities to banks. The degree to which debt is absorbed by banks, and, hence, the degree to which financial-asset accumulation is in deposit or currency form expresses the preference of spending units for the asset that is fixed in price (as distinct from value).

Before financial intermediaries other than the monetary system assume importance, monetary theory in the sense of theory about the supplying of and the demand for money relative to the supplying of and demand for direct securities ("bonds") is a perfect balance-sheet counterpart for income theory, saving-investment theory, or surplus-deficit analysis. In so simple a financial system the disposition of surpluses and deficits is accounted for completely by accumulation of direct debt and of indirect debt in money form. Economic theory can appropriately limit its attention to goods, bonds, and money as long as the institutionalization of saving and investment is confined to the monetary system.

In this country, especially since 1900, the innovation and growth of other financial intermediaries have greatly diversified the channels through which loanable funds can flow, the types of financial assets that surplus units may acquire, and the markets on which deficit spending units may sell direct securities. Prior to 1900 the commercial banks shared the field of intermediation with mutual savings banks, savings and loan associations, insurance companies, and a few lesser competitors. To these competitors have been added, since 1900, the Federal Reserve banks, public and private pension funds, governmental insurance and lending agencies, postal savings, credit unions, private investment companies and others. Each of these intermediaries issues its distinctive form of indirect debt—for example, savings deposits, savings and loan shares, pension claims—and thus provides a distinctive package of financial services as a financial asset for spending units to accumulate in substitution for direct debt or money. They compete among themselves, with banks, and with direct finance, for the direct securities that emerge from deficit units. Institutionalization of saving and investment has amounted to differentiation of product in the field of finance.

How nonmonetary financial intermediaries fit into a complete set of social accounts is clear. In the process of economic change and development spending units with surpluses accumulate financial assets, direct and indirect, with the indirect assets taking more variegated form. Spending units with deficits accumulate indebtedness, with the debt outstanding to more diversified bodies of creditors. Aggregate debt rises at a faster pace relative to wealth if deficits and surpluses rise relative to income, if income rises relative to wealth, and if an increasing proportion of direct debt moves into the portfolios of financial intermediaries.

The familiar trichotomy in theory of goods, bonds, and money does scant justice to this complex pattern of real and financial change. By implication financial intermediaries other than the monetary system are netted out of the social accounts, their holdings of direct debt attributed to their creditors.[8] We argue that any domestic debt can be netted out—direct debt and money too—if one pursues far enough the doctrine that "after all we owe the debt to ourselves." We will argue in the next section that elimination from the social accounts or from economic reasoning of any significant body of debt conceals determinants of economic behavior on the part of spending units.

We are deviating from conventional doctrine in regarding the banking system as one among many financial intermediaries, sharing with the others the functions of indirect finance. We take exception to the view that banks stand apart in their ability to create loanable funds out of hand, while other intermediaries in contrast are busy with the modest brokerage function of transmitting loanable funds that are somehow generated elsewhere.

Neither banks nor other intermediaries create loanable funds. That is the prerogative of spending units with surpluses on income and product account. Both banks and other intermediaries have the capacity to create special forms of financial assets that surplus units may accumulate as the reward for restraint on current or capital spending. Banks alone have the capacity to create demand deposits and currency, to be sure, but only savings and loan associations can create savings and loan shares: both "create credit," both transmit loanable funds, both enable spending units to diversify their portfolios.

Banks do have a virtual monopoly of the payments mechanism, and only claims upon monetary intermediaries embody the privilege to use this mechanism. The fact that other intermediaries make use of the payments mechanism, which the banks administer, has sometimes been

[8] Even the monetary accounts are too rarely retained explicitly in the accounts. For an unusual and interesting experiment in keeping the income accounts and monetary accounts together see Henry K. Heuser, "Recent Financial Changes in Western Germany," *Fed. Res. Bull.*, Oct. 1954, XL, 1041-50.

interpreted to mean that other intermediaries have the inferior role of brokerage in loanable funds while the banks have the superior role of creation of loanable funds. Both types of institution, on the contrary, are loanable-fund brokers. Both create credit. Whether it is the banks or others which create credit in any period depends not on the banks' role in administering the payments machinery but instead on the preference of spending units for deposits and currency to hold as against other financial assets to hold.

C. *Financial Trends in the United States.* Table I itemizes some rough measures of change over the past half-century in this country's aggregate debt structure. National financial assets have risen by half again as much as wealth. Financial assets owned by intermediaries, in turn, have risen by half again as much as national financial assets: indirect debt has been a growing proportion of total debt. Self-finance and direct finance have accounted for a diminishing proportion of flows of loanable funds.

TABLE I.—ACCUMULATION OF FINANCIAL ASSETS, 1900–1949[a]
(percentages)

	1900	1929	1949
Proportion of:			
1. National financial assets to national wealth	82.1	123.2	124.9
2. Financial assets of financial intermediaries to national financial assets	25.5	28.6	38.5
3. Financial assets of commercial banks to national financial assets	13.9	12.2	14.0
4. Financial assets of commercial banks to financial assets of all other financial intermediaries	119.7	75.0	57.3
5. Financial assets of commercial banks to financial assets of other private financial intermediaries[b]	120.5	83.7	94.7
6. Financial assets of commercial banks to national wealth	11.4	15.1	17.5
7. Financial assets of commercial banks to gross national product	53.9	63.8	60.1
8. Money supply to financial assets of financial intermediaries other than commercial banks and Federal Reserve banks[c]	66.5	31.9	46.8

[a] R. W. Goldsmith, *The Share of Financial Intermediaries in National Wealth and National Assets, 1900–1949*, p. 97. Data from this source have been adjusted in Table I for improved estimates that Goldsmith will publish in subsequent studies.

[b] "Other private financial intermediaries" exclude Federal Reserve banks, government lending institutions, government insurance and pension funds.

[c] The money supply in this case includes adjusted demand deposits and currency outside banks.

The commercial banks' share of all securities has been nearly constant, in the range of 12-14 per cent. But the proportion of their holdings to those of other intermediaries fell by more than half in 1900-1949, from 119.7 per cent to 57.3 per cent. Their relative participation in indirect financing has declined. As comparison between items (3)

and (5) in Table I indicates, a little less than half of their loss in status can be traced to the rise of the Federal Reserve and of government financial institutions, while a little more than half is attributable to gains made by financial intermediaries of a private character. The commercial banks have grown at a faster pace than national wealth and national income, but they have lagged behind the pace of general financial development. To a smaller degree, as item (8) suggests, creation of money by the monetary system as a whole has lagged behind creation of indirect financial claims by other financial intermediaries.[9]

III. *Output Growth, Interest, and Finance*

For nearly two decades analysis of income, interest, and money has conformed to the Keynesian model. This model is not an efficient instrument for studying economic development in either its real or its financial aspects. On the side of goods, the model is inefficient because it does not allow for the effects of investment and of growth in the labor supply on output capacity. Once these effects are admitted, as in the Harrod and Domar growth models, investment appears in a dual role. As an element in effective demand, it is an economic stimulant, but as an increment in capacity its effects may be depressing.

On the side of finance, the Keynesian model is inefficient because it does not allow for the effects of spending and deficits on debt and on financial capacity of spending units to sustain their spending. Deficits, like investment, leave an economic residue. In the case of investment, the residue is output capacity. In the case of deficits, the residue is debt and a change in financial capacity.

A. *The Liquidity-Preference Model.* The Keynesian or liquidity-preference model embraces so short a time period that current expenditures, including investment, cannot lead to an increase of wealth or of direct debt.[10] The model appears to exclude borrowing, so that loanable funds cannot flow and cannot affect the rate of interest. However, in

[9] For an exhaustive listing of financial intermediaries, the reader is referred to various writings of R. W. Goldsmith. These include: *The Share of Financial Intermediaries in National Wealth and National Assets, 1900-1949*, National Bureau of Economic Research, Occas. Paper 42 (New York, 1954); *Financial Structure and Economic Growth in "Advanced" Countries, op. cit.; A Study of Saving in the United States* (Princeton, 1955).

Goldsmith has classified intermediaries as follows: (1) The banking system (Federal Reserve banks, commercial banks, savings banks, the Postal Savings system); (2) Other depository organizations (saving and loan associations, credit unions); (3) Insurance organizations (private life insurance, private pension funds, government insurance and pension funds, property insurance companies); (4) Other financial intermediaries (investment companies, Land Banks, mortgage companies, finance companies, security brokers and dealers, government lending institutions, personal trust departments, commercial paper and discount houses, acceptance dealers, foundations, title guaranty companies).

[10] Short-period, self-liquidating "finance" was an afterthought which Keynes apparently did not regard as a deviation from the initial form of his model. It was a temporary rise in direct debt, shortly to be liquidated.

Keynesian dogma, the rate of interest does depend on *past* flows of loanable funds though it does not depend on current flows. Past flows have left the heritage of a stock of direct debt or bonds. The distribution of past flows between direct channels of finance and one indirect channel, the monetary system, has affected the allocation of bonds between spending units and the monetary system, and as a result, the proportion of bonds to money in the portfolios of spending units.

Though the stock of bonds cannot rise in the Keynesian short period, the historic distribution of bonds can be changed, according to the dictates of monetary policy, by monetary techniques. The function of monetary techniques is, in fact, to transfer bonds between the banking system and spending units and, if fortune smiles upon the authorities, to change in the desired direction the marginal rate of preference by spending units for bonds against money.

To the degree that bonds are held by banks, spending units hold money created by the banks. An ample supply of money implies in the Keynesian model that the taste for liquidity is relatively sated.[11] With bonds in short supply to spending units, the taste for interest is relatively unsated, and the price of bonds in terms of money is high. If bonds are held not by banks but by the public, money and liquidity are in short supply. Then the taste for interest income is relatively sated, bond prices are low in terms of money, and the interest rate is high.

Given factors that affect the intensity of demand for liquidity and money—income, speculative anticipations, and precautionary needs—the price of bonds depends on where bonds are, whether in the portfolios of banks or in the portfolios of spending units. In static equilibrium, the distribution of bonds must yield that rate of interest at which, given the level of income, *ex-ante* surpluses and deficits are equal and spending units are content with the division of their financial assets between bonds and money.

This Keynesian model is inappropriate to financial aspects of growth analysis for two reasons. First, it does not permit direct debt to accumulate and affect financial determinants of spending. Second, it admits only two kinds of financial asset, money and bonds, on the assumption that the stock though not the location of bonds is fixed. The model is not hospitable to the financial intermediaries whose development in recent decades has diversified indirect finance and marked commercial banking as a relatively declining industry. Briefly, the financial aspects of the Keynesian model ignore the long-period ac-

[11] Keynes, it will be remembered, had his doubts about equating money and liquidity if money is defined in some narrow way. See, *General Theory of Employment Interest and Money*, p. 167.

cumulation of securities and the secular institutionalization of saving and investment.

B. *Debt Accumulation and Interest Rates.* The Keynesian model may be adapted, first, by extending the time period to permit loanable funds to flow and debt to accumulate. We may continue to suppose, for the time being, that debt and financial assets consist of bonds and money. The revised model needs to be a dynamic one in which divergent rates of growth in wealth, income, and debt influence the willingness of spending units to incur deficits and debt and to accumulate financial assets.

Suppose, for the moment, a given level of national income and of demand for transactions balances of liquidity.[12] Suppose, also, a given disposition on the part of spending units to incur deficits and to finance them by borrowing. Then, if loanable funds take only the direct route with none flowing through the banking system—if the supply of money is fixed— accumulating bonds accrue to surplus spending units, and deficit units incur an increasing bulk of debt. The effect on both types of spending unit may well be such as to disturb an initial aggregative equilibrium.

The portfolios of surplus spending units deteriorate, as bonds or illiquid assets gain relative to liquidity in money form. This decline in the liquidity index of their portfolios may induce surplus units to express a *diversification demand* for additional money balances that does not depend on the speculative and precautionary considerations of Keynesian short-run liquidity preference. With the supply of money given, the diversification demand may bring about a rise in interest rates that can depress national income below its initial level.

Surplus units, then, may absorb an increasing stock of bonds only at a rising discount. Meanwhile, the propensity of deficit units to spend may decline as debt accumulates over a succession of periods and as debt charges gain on income. A fall in interest rates, or a general easing in credit conditions, may be needed to prevent suppression of spending. A growing disinclination on the part of deficit units to issue debt at given interest rates may accompany the rising diversification demand for money relative to bonds on the part of surplus units.

Because of debt accumulation, equilibrium at the given level of income is threatened. Just as investment may add to output capacity and so jeopardize the level of national income, the issue of debt through the

[12] Our purpose, in assuming national income constant at the first step of the analysis, is to isolate the accumulation of debt as an independent determinant of the demand for money or its substitutes. Debt can and does accumulate even when income is falling as well as when it is constant or rising. So a monetary authority cannot safely adopt the rule that demand for money increases only as income grows—or only as conventional speculative demand rises.

channels of direct finance may have its deflationary impact through the responses of both deficit and surplus units.[13]

To protect the processes of growth from this deflationary impulse, the monetary authority would need to permit an expansion of the money supply. It would recurrently ease the position of banks so that some increasing share of loan funds would flow indirectly, and so that money would be sufficiently plentiful in the total of financial assets to maintain or even reduce the level of interest rates. For the ease of mind of the economy, the monetary authority should announce that it would underwrite expansion of the money supply at the annual rate of x per cent even if national income were to remain constant. If the authority did not act, deficit spending units would be forced into direct finance and ultimately to self-finance on a falling level of national income.

The optimal rate of increase in the money supply, at a given level of income, would vary according to the illiquidity of bonds that the banks would buy. The rate could be relatively low if the banks were, for example, to lend long and leave to the public the more liquid short-term assets. The rate would be high if the public were left with a scant supply of more or less close substitutes for money. The optimal growth in the money stock, at a given level of income, depends then on the accumulation of debt, the effect of indebtedness on deficit spending, the asset preferences of surplus units, the maturity structure of the debt and its other qualities, and the character of the banking system's portfolio.

If income rises, too, along with output capacity and debt, the pressure on interest rates is even more emphatic. The rise in income intensifies the transactions demand for liquid balances. If steady growth in output requires stability in interest rates and other terms of lending, monetary policy must induce expansion in the money supply to satisfy the diversification and transactions demands for money that result from rising debt and rising income. The banking system must be permitted to grow so that the portfolios of surplus units will not be oversupplied with bonds and undersupplied with money.

How fast the money supply must rise, to stabilize terms of lending when income is rising, depends partly on the rate of increase in income. Evidently the money supply must keep in step with demand for money balances. The diversification demand depends on the stock of debt, which falls in proportion to income the more rapidly income gains. While the diversification demand may become smaller in proportion to income, as the pace of growth in income increases, the transaction demand may grow proportionally with income. The sum of these demands,

[13] Joan Robinson, "The Concept of Hoarding," *Econ. Jour.*, June 1938, XLVIII, 235.

then, lags behind income as income gains at a faster pace. It follows that the ratio of increments in the money supply to increments in the income level can be reduced as income gains at a faster pace. The marginal velocity of money may rise, without strain on credit conditions, if income is sufficiently buoyant.[14]

C. *Interest Rates, Money, and Other Financial Assets.* In the standard model the rate of interest depends on the proportional allocation of bonds between spending units and the financial institutions that create credit in the form of money, or "pure" liquidity, for spending units to hold as a substitute for bonds. In so rigid a form, nonbank financial intermediaries are neglected. There have been desultory efforts to correct this rigidity.[15] The definition of money has been widened at times to include time deposits, and the point is sometimes made that still other financial assets have the quality of liquidity only a little diluted. They, too, it is implied, should be added to the liquid things that the public may choose over bonds, and the institutions that issue them should somehow be attached peripherally to the monetary system. Then, presumably, the rate of interest can depend on the distribution of bonds between the public and this expanded "monetary" system.

A more decisive break with liquidity-preference theory seems advisable. Liquidity is not the only characteristic that distinguishes bonds from alternative financial assets. Each financial intermediary offers its own differentiated product for the public to hold. This product is competitive with bonds. It may be more or less liquid than bonds, but it embodies a service, perhaps insurance, that bonds do not. The product is also competitive with money narrowly defined, offering less in liquidity perhaps but offering as well security, interest, insurance, and other services. In view of the increasing variety of financial assets, it does seem appropriate to abandon liquidity as the pivotal factor in

[14] Suppose that spending units issue debt in a proportion of their deficits which, in turn, are b proportion of national income Y. For present purposes, we may assume ab is constant. The issue of direct debt in any period is abY. Spending units may choose, at given interest rates, to hold only e proportion of direct debt issues abY, and may express an incremental diversification demand for money balances of $(1-e)\ abY$. Incremental transaction demand for money balances is $t\,\Delta Y$, so that total incremental demand for money is $(1-e)\ abY + t\,\Delta Y$. Equilibrium requires that the increase in the money supply ΔM should equal demand:

$$(1)\quad \Delta M = (1-e)\ abY + t\,\Delta Y$$

Dividing by ΔY, it follows that:

$$(2)\quad \frac{\Delta M}{\Delta Y} = (1-e)\ ab\frac{Y}{\Delta Y} + t$$

Hence, the higher ΔY for a given Y, the lower may be ΔM for a given ΔY and the higher may be marginal velocity or $\Delta Y/\Delta M$.

[15] John Lintner, "The Theory of Money and Prices," *The New Economics*, ed. by Seymour E. Harris (New York, 1947), pp. 516-23.

interest theory. The price of bonds, we may say, depends on where the bonds are and on the pattern of preference among spending units for the increasingly rich and variegated menu of financial services attached to financial assets.

A simple exercise in short-period static analysis may suggest the effects of bringing these other financial assets than bonds and money into interest theory. We suppose that the availability of these financial assets does not affect the propensity of spending units to spend on output. The period we consider is Keynesian, and the supply of money and direct bonds is given. In one static position, only bonds and money are available and demanded, and an interest rate is determined. In the comparative position, other financial assets may be supplied and demanded. The difference between interest rates on direct bonds, in these comparative positions, depends in general on the degree to which the other financial assets are substitutes for bonds or substitutes for money.

We assume that supply of the nonmonetary indirect financial assets is infinitely elastic, and that the demand by spending units for these assets brings about a roughly equivalent demand for bonds by nonbank intermediaries. If these other assets are substitutes for the given stock of money in the portfolios of spending units, a demand for them brings nonbank intermediaries to the bond market to compete for bonds with spending units. Then the price of bonds must be higher and the interest rate lower than when banks are the sole intermediaries. The price of bonds rises because the total demand for bonds exceeds the fixed supply at the price which would prevail if only bonds and money were supplied and demanded, or because the demand for money by spending units falls short of the fixed supply at the interest rate that would be appropriate if only bonds and money were available.

If, on the other hand, nonmonetary indirect financial assets are substitutes for bonds in the portfolios of spending units, the price of bonds may be the same in our two static cases. In this situation, the demand for bonds by nonbank financial intermediaries displaces demand by spending units. If nonmonetary indirect financial assets, finally, are substitutes for both bonds and money, their effect must be a fall in the interest rate of smaller magnitude than we expect when only the demand for money is affected.[16]

D. *Suggestions for a Financial Theory of Growth.* A theory of interest and income which allows for accumulation of debt and for the

[16] The analysis in the text may be illustrated by a diagram adapted from Lerner. In the diagram L is the demand for money, and S is the supply of money. A is total financial assets of spending units, increasing as the value of the fixed stock of bonds rises with falling interest rates. The horizontal distance, at any interest rate, between L and A is the

growth of nonmonetary financial intermediaries is a more useful tool than short-period liquidity-preference theory for analysis of economic development. Such analysis of development on the side of finance should, of course, be integrated with analysis of development in real terms.

The investment component of national income, together with growth in the labor supply, raises output capacity. Given the consumption function, investment must rise, from period to period, to generate the

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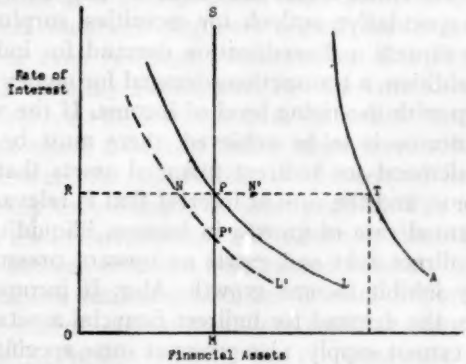
demand for bonds. The horizontal distance, at any interest rate, between S and A is the supply of bonds. The equilibrium rate of interest is OR, because at that rate there is equality between supply and demand for both money and bonds.



Assume now a demand by spending units for other financial assets. Assume, too, that they are substitutes for money. The demand for them at OR is NP, so that the demand for money is shifted to L' from L. NP measures also the excess supply of money at interest rate OR and the demand for bonds by nonbank intermediaries. Since at OR there is both an excess supply of money and an excess demand for bonds, the rate of interest must fall to MP'.

Assume, next, that the new financial assets are substitutes for bonds. A rise in demand for them does not affect the demand for money which remains at L. At OR rate of interest, the public's PN' demand for other financial assets than bonds is replaced by new institutional demand for bonds. The rate of interest is not affected.

If the other financial assets are substitutes for both bonds and money, the L curve shifts somewhat to the left, yielding an interest rate between MP' and MP. There are still other possibilities. For example, the financial assets other than bonds and money may be substitutes for money but complements of bonds. Then the interest rate must fall very sharply to accommodate the increase in demand for bonds by both spending units and nonbank intermediaries. If the other financial assets are complements of money but substitutes for bonds, evidently the rate of interest must rise. Both of these cases would appear to be unrealistic.

The analysis of multidimensional asset choice does not fit comfortably into the diagram's conventional geometry of liquidity preference. The NP demand for financial assets other than bonds or money is not solely a demand for liquidity. It is also a demand for security, income, insurance, and other services. Since, over the past half-century, NP has grown relative to an expanding RT, "liquidity preference" has come to be less and less relevant to determination of the rate of interest.

demand that is compatible with expanding capacity to produce. Otherwise some capacity lies idle, and the excess jeopardizes growth. If investment is accelerated by change in income, there is some rate of income growth that equates *ex-ante* saving and investment, or surpluses and deficits, at full-capacity output.

At this warranted rate of growth in income, with deficits and surpluses equal *ex-ante,* planned issues of debt by deficit spending units are equal to planned additions to financial assets by surplus spending units. Still the plans of deficit units and surplus units may be incompatible on financial grounds. At terms of lending which are appropriate to the warranted path of investment, surplus units may be disinclined to buy the entire direct debt issue of deficit units. Apart from changes in the speculative outlook for securities, surplus units should be expected to express a diversification demand for indirect financial assets and, in addition, a transactions demand for money to keep active balances in step with the rising level of income. If the warranted rate of growth in income is to be achieved, there must be some way of satisfying the demand for indirect financial assets that arises out of the rise in income, and the rate of interest that is relevant to it.

At the warranted rate of growth in income, illiquidity accumulates in the form of direct debt and exerts an upward pressure on interest rates that may inhibit income growth. Also, if income grows at its warranted pace, the demand for indirect financial assets, which deficit spending units cannot supply, also grows at some specifiable pace. Any complete growth model must reconcile the accumulating stock of illiquidity with the growing aversion to illiquidity at terms of lending that are suitable to the investment component of warranted income levels. The reconciliation evidently involves growth of financial intermediaries to absorb illiquid direct debt and to issue indirect debt according to the preference patterns of surplus spending units. Even if the warranted rate of growth in income were zero, direct debt would continue to grow and some portion of it would need to find its way into portfolios of intermediaries.

The need for indirect finance to hold interest rates on their optimal trend does not necessarily imply a high rate of growth for banking assets and the money supply in a buoyant economic system. Indeed the banking system may stagnate, without ill effects on the growth rate of income. In the growth process, spending units may choose to diversify their portfolios by adding to their holdings of nonmonetary indirect financial assets. Then, nonbank intermediaries absorb the requisite share of direct debt at the appropriate price. The growth of nonbank intermediaries relative to the banking system may imply

even downward pressure on interest rates at the very time when the growth of income is leaving the money supply far behind.[17]

In long-period analysis, it is a mistake to suppose that the optimal growth of the money supply is some simple function of trends in income or even of income and debt. The necessary growth in the money supply may be high or low, positive or even negative, depending on the growth of income, the share of spending that is externally financed (especially by long-term securities), the growth in demand by spending units for direct relative to indirect financial assets, and on the development of financial intermediaries whose indirect debt issues are competitive with money.

The complexities of a growth model that incorporates the financial as well as the real conditions of growth appear, for the present at least, to defy simple or even systematic formulation. The Keynesian short-period model is certainly inadequate, for the reasons we have mentioned and for others too. For example, its money markets are competitive markets where a host of deficit units meet a host of surplus units under the watchful supervision of the central bank. Rates on these markets may vary sharply in short periods. The rise of indirect finance implies that relatively few and relatively large intermediaries are interposed between ultimate lenders and ultimate borrowers. The result is that capital rationing becomes a more important allocative device, with the rate of interest tending to stabilize about its trend line.

Again, in the Keynesion model, "the" interest rate may fall to a floor that is established by absolute liquidity preference on the part of spending units. One apparent effect of indirect finance, of the institutionalization of saving and investment, is to reduce this irreducible minimum. Nonbank intermediaries may drive bond prices high both because funds must be invested to cover operating expenses and because, while the intermediaries are growirg, the continuous net receipts of new funds make asset liquidation unnecessary. Growing intermediaries are "firm hands" that may acquire and hold both bonds

[17] This point may be put more concretely in terms of a modified form of equation (2) in note 14. It is necessary only to take into consideration the fact that part of the diversification demand for indirect financial assets (which in note 14 took the form solely of a demand for money balances) may in fact be satisfied by nonmonetary indirect financial assets. If, as before, the incremental diversification demand for indirect financial assets is $(1-e)abY$, suppose that $m(1-e)abY$ is the share of this incremental diversification demand that is satisfied by currency and deposits. Then it appears that the rise in demand for money as income grows is affected by the rate of income growth $(\Delta Y/Y)$, the course of deficit finance (b), the issue of direct debt (a) to finance deficits, the demand for indirect financial assets $(1-e)$, the share of this demand which can be satisfied by nonmonetary indirect financial assets $(1-m)(1-e)$, and the intensity of the transactions demand for money (t).

and equities at prices which would be unreasonably high in a more primitive financial system.

An additional complexity is that development of financial institutions, including nonbank intermediaries, is both a determined and a determining variable in the growth process. The accumulation of assets and the secular rise in incomes stimulate the demand by spending units for financial services in increasing variety. The income elasticity of demand apparently is high not just for liquidity but for financial services in general, and the result in this country is that indirect finance has gained more rapidly than income, wealth, and direct debt. Moreover, any rise in interest rates brought about perhaps by a combination of restrictive monetary policy and accumulating debt creates the opportunity for nonbank intermediaries to offer more expensive attractions to creditors and hence to compete more actively with banks.

A shifting pattern of deficits and surpluses in the growth process may create opportunities for some intermediaries and destroy opportunities for others. All deficit spending units are not equally congenial borrowers for banks and for other intermediaries. All surplus units do not have the same complex of preferences among the financial issues of banks and other intermediaries. This financial incompatibility of spending units and intermediaries may give rise to "matching" problems, in which a shifting distribution of surpluses between spending units favors certain intermediaries that cannot, by law or custom, purchase the concurrent direct issues of deficit spending units. Then there is pressure to change the law or custom, the composition of direct debt, or preferences for financial assets among surplus units. Matching problems that stimulate financial innovation may arise in many other ways, for example from changes in the form of investment or in the geographic location of economic activity. The process of growth conditions, in these and other ways, the relative development of indirect finance in comparison with self-finance and direct finance, and the share of indirect finance that flows through banks and their competitors.[18]

[18] The processes of growth affect and are affected by other financial institutions than intermediaries. The stock market is a case in point. Bullishness on the market may increase the attractions of direct finance, reducing the rate at which intermediaries must grow in order to achieve an optimal trend in security prices. Bearishness may depress direct finance and require more rapid growth by intermediaries. In long periods the volume of dealings on the market, the behavior of its prices, and their importance to income levels are influenced by trends in methods of finance. When self-finance predominates, the market is a subsidiary element of the financial system, and even wide swings in its prices may affect investment negligibly. With development of direct external finance, price behavior on the stock exchanges should exert significantly greater influence on spending. Once indirect external finance has gained stature, financial intermediaries as large purchasers of direct securities may steady the market, reduce the frequency of wide price fluctuations, and moderate the influence of price fluctuations on deficit spending.

E. "MV" *and Financial Theory.* Conventional short-period doctrine about money and interest can be phrased in terms of the velocity of money. Velocity rises as the proportion of transactions balances (with positive turnover) gains relative to speculative balances (with zero turnover). This proportion is raised by an increase in income, given the money supply, or by a decline in the money supply, given the level of income. Since an increase in income or a decline in the money supply increases the interest rate, the interest rate is positively correlated with velocity.

Various exceptions to this relationship are familiar. Velocity may vary, with the interest rate given, if liquidity preference is infinitely elastic. The interest rate may vary, with velocity unchanged, if liquidity preference has zero elasticity. A shift in liquidity preference may disturb the relationship. Again, if both the money supply and income are variable, the relative behavior of velocity and interest rates depends on the elasticity of liquidity preference and marginal efficiency, and on the consumption function. For example, with liquidity preference inelastic, marginal efficiency highly elastic, and with a high marginal propensity to consume, one might expect a fall in interest rates simultaneously with a rise in the marginal velocity of money. The outcome for average velocity would depend, of course, on its initial level prior to the adjustment. The relationship of velocity to interest rates may be changed, too, by shifts in the spending functions.

The relationship between velocity and interest rates is still more attenuated when one allows not only for the complications listed above but also for the diversification demand for money and for the substitutability between money and other indirect financial assets. The diversification demand depends on the level of income, so that marginal and average velocity can vary according to rates of change in income without corresponding changes in interest rates. If other financial assets are available to satisfy the diversification demand, as substitutes for money, the money supply may fall and interest rates simultaneously decline as a reflection of the public's growing preference for these money substitutes. While income and debt are growing, the public may reject money balances in favor of insurance reserves, pension funds, or perhaps savings and loan shares. Because money becomes a smaller share of total financial assets, velocity becomes a less reliable index of interest rates.[19]

[19] In the 1920's nonbank intermediaries gained on banks at an especially rapid rate. The ratio of their assets to assets of banks rose from .77 in 1922 to 1.14 in 1929. In the same period income velocity of money with money narrowly defined, rose from 3.4 to 3.9 while long-term bond rates fell from 4.71 per cent in 1922 to 4.05 per cent in 1928 and 4.42 in 1929. Various reasons for the opposing movements in velocity and bond rate may be alleged, but one of them must have been the unprecedented growth of nonbank intermediaries.

As money becomes a smaller proportion of financial assets and as the demand for it comes to be related in a more complex fashion to interest rates and income, the "money approach" to analysis of interest rates and income loses precision. To make use of *MV*, one necessarily puts a more and more severe strain on the velocity component, or on the money component by including every financial asset. The strain may be too much to bear since a rise in *V*, with the narrow definition of money, may mean either that all credit expansion including that of banks is restricted, so that interest rates are rising, or that the flow of loanable funds is bypassing banks at falling rates of interest. If a rise in *V* is compatible both with credit ease and with credit tightness, one is tempted to conclude that time and financial evolution are outmoding *V* as an analytical tool. The allied concepts of hoarding and dishoarding necessarily fare no better.

If the *MV* approach to accounting for security prices and flows of income is ambiguous, so too is the monetary approach to explaining the level of prices for commodities. Prices of goods may rise because loanable funds are accessible too easily and cheaply through the intermediation of the monetary system. They may also rise because other indirect finance is too ample, given the flexibility of supply in real output. Prices may fall because deficits are depressed not only by "tight money" but by "tight savings deposits" or "tight insurance." As financial evolution proceeds, one salvages conventional quantity theory by so extending the concepts of *M* and *V* that they bear little resemblance to "means of payment" and "turnover of means of payment."

IV. *Financial Controls in a Growth Context*

Principles and techniques for regulating flows of loanable funds that are optimal in terms of short-period models, with money as the only indirect financial asset, may not be optimal in a growth context, with diversity of indirect financial assets. This is not the occasion to explore carefully how growth analysis may affect one's perspective on financial controls, but we do wish to point out a few illustrative leads.

A. *Monetary Control.* In the conventional short-period model, monetary controls shift direct debt between the central bank, the commercial banks, and the public. The effect is to change the money supply and the valuation of direct debt in terms of money to a degree that depends on speculative, precautionary, and transactions demands for money balances. This adjustment in the interest rate affects, perhaps, expenditures of spending units, their deficits, and so the flow of loanable funds.

There have been many proposals regarding the policy that should guide monetary controls in the long run; for example, that the money

supply should be induced to grow at a constant rate, or at the same rate as income, or at a rate higher than income to accommodate, say, the rising demand for liquidity that might result from gains in income or wealth per capita. One recalls, of course, the policy prescription that money should accummulate fast enough to keep the interest rate at its presumed irreducible minimum. None of these prescriptions seems to account adequately for effects on terms of lending of changes in growth rates of income and debt, in the structure of debt, in the variety of financial assets, and in relative demands for competitive varieties of financial assets.

Suppose, for the moment, that banks are the only intermediaries. We have seen previously that the behavior of national income cannot properly be the sole criterion of monetary policy. Growth in stocks of debt and output capacity may require growth in the stock of money even with the flow of income constant. But the monetary expansion associated with any growth curve of debt may be reduced if the direct debt itself can satisfy the diversification demand for financial assets. So short-term public debt may displace money, and debt management may displace monetary controls. In general, public-debt management and monetary controls should have identical goals, of satisfying the complex demand of spending units for financial assets at given terms of exchange between direct debt and money. There should be no opportunity whatever for them to work at cross-purposes.

At rising income levels there can be no simple formula of monetary expansion, even when money is the only indirect financial asset. To satisfy the transactions demand for balances, money may need to grow as fast as or faster than income. To satisfy diversification demand, at given interest rates, it may lag behind income. To offset the effects of growing output capacity and growing debt on propensities to spend, it may need to run ahead of income. How speculative and precautionary demands for balances vary as income rises is not apparent. For any rate of gain in income, the optimal growth of money cannot be determined independently of the specific growth context.

Growth of the money supply implies growth of the monetary system, especially of the central bank and the commercial banks. If the latter's reserve requirements are stable, they and the central bank must grow at about equal rates, each continuously absorbing direct debt of deficit spending units. With varying reserve requirements, commercial banks and central bank may grow at different rates. If reserve requirements rise for member institutions, the central bank acquires direct debt and supplies new money balances. If reserve requirements fall, the commercial banks do the job of indirect finance.

In view of its portfolio limitations, the central bank can grow most

readily when deficits are in the government sector. Relative growth of the central bank when government debt is a fixed stock has the disadvantage of withdrawing from the markets government securities that may be more or less close substitutes for money. In this case, to maintain interest rates, the money supply may need to grow faster if it is provided by the central bank than if it is supplied through purchases of private securities by commercial banks.

If accumulating direct debt is private debt and if the central bank is subject to customary restraints on the kinds of assets it may hold, monetary growth apparently should be concentrated in commercial banks, and their reserve requirements must take the downward trend. This prospect is disturbing on at least two counts. First, for reasons well known in banking theory, low reserve requirements for commercial banks increase short-period instability in the money supply. Second, the commercial banks can assume only at some risk the responsibility for supplying a rising share of indirect finance. As principal administrators of the payments mechanism, they must be solvent beyond doubt. As financial intermediaries, on the other hand, the commercial banks must underwrite the growth process with venture finance, buying securities from spending units that are taking the risk of innovation and expansion. In one role, the banks must minimize risk; in the other role, risktaking is necessary and proper.

Unless, then, there are government deficits in the growth process, the monetary system is not the ideal vehicle for financial growth. The direct securities that accumulate with real growth in the private sector do not tend to match the portfolio requirements of the central bank or of an indubitably solvent commercial banking system. This handicap can be counterbalanced if the central bank portfolio is liberalized or, say, if there are government guarantees of bank deposits and bank assets. It can also be aggravated by unimaginative bank management or such restrictive banking regulation as the ban on branch banking which keeps the lending capacity of individual banks from growing with the borrowing requirements of individual deficit spending units. The fact is, in this country, that the banking system has not been able simultaneously to keep solvent, to absorb even a constant share of the expanding supply of direct securities, and to keep pace with the expanding demand for indirect financial assets.

B. *Financial Control*. Inadequacy of the monetary system has at least two effects. It provides an incentive to self-finance, especially for large business firms. Second, it creates opportunities for competitive development of nonbank financial intermediaries. When monetary expansion is restrained, real growth supplies the direct securities at at-

tractive prices as well as the demand for indirect financial assets that other intermediaries can exploit.

These nonmonetary intermediaries have not been acknowledged generally in this country as competitors with banks, and as substitutes for them, in easing terms of external finance and hence of deficit spending. Regulatory techniques have not been evolved in any systematic way to cope with them as instruments of indirect finance. Their equivalent of the Federal Reserve Act is still to come.

The lag of regulatory techniques behind the institutional development of intermediaries can be overcome when it is appreciated that "financial control" should supplant "monetary control." Monetary control limits the supply of one financial asset, money. With a sophisticated financial structure providing financial assets, other than money and bonds, in increasing proportion to both, control over money alone is a decreasingly efficient means of regulating flows of loanable funds and spending on goods and services. Financial control, as the successor to monetary control, would regulate creation of financial assets in all forms that are competitive with direct securities in spending units' portfolios. "Tight finance" and "cheap finance" are the sequels of "tight money" and "cheap money."

A monetary authority which is tempted to stay within the bounds of its traditional controls because they are quantitative, general, and impartial, may find itself more and more out of touch with credit developments in critical growth areas where lending by nonbank institutions is predominant. Traditional controls are more appropriate to competitive loanable-funds markets than to markets that are dominated by a few large institutional lenders such as insurance companies. On imperfectly competitive markets, where a few nonbank institutional lenders are important market forces, capital rationing may become the critical medium for enforcing financial control.

Nonbank institutional lenders give rise to special problems in financial control because they are imperfectly competitive and also because they are specialized. Since they do buy a rather narrowly limited variety of assets and issue specialized varieties of indirect financial claims, there can be a credit impasse that is not characteristic of open and competitive markets for loanable funds. Intermediaries whose debt may be in demand by spending units may be inhibited by law or self-restraint from lending to sectors where demand for capital formation is most active. Traditional monetary controls do not solve this issue of debt incompatibility.

There are solutions. One is to relax legal restraints, say by permitting insurance companies to invest in mortgages and common

stocks, so that intermediaries become less specialized. The intermediaries themselves may venture into new varieties of asset and debt. Secondary intermediaries such as personal finance companies, may arise to assume risks that primary intermediaries avoid. Government institutions may hold securities not wanted elsewhere, may guarantee such securities, or discount them. Solutions for this problem of matching borrower and lender have been found. But they have been found with some delay, and it is not always apparent that they are the optimal solutions.

Central bank operations in long-term public debt may reverberate further through the financial system than operations in short-term debt. According to the doctrine of credit availability, such important intermediaries as insurance companies and savings banks are sensitive to change in bond prices or to uncertainty about bond prices. The liquidity of their portfolios is reduced by a rise in rates on Treasury bonds. To restore liquidity, intermediaries tend to buy still more government securities, possibly of shorter maturity. They tend also to contract direct lending on mortgages or industrial loans. The contraction of lending may mean a rise in interest charges to private borrowers, but its immediate and perhaps most powerful implement is credit rationing.

This availability doctrine acknowledges the parallelism between banks and other intermediaries. It imposes on the central bank responsibility for supervision over indirect finance generally rather than over indirect finance through banks alone. We cannot be sure that it is based on a sound estimate of intermediaries' portfolio practices, but we do regard it as a provocative step in the transition to theorizing about financial control as distinct from monetary control.[20]

[20] Samples of the literature on the credit availability doctrine include, Statement of Paul Samuelson, *Monetary Policy and the Management of the Public Debt*, Hearings before the Subcommittee on General Credit Control and Debt Management of the Joint Committee on the Economic Report, 2nd sess., 82nd Cong., March 1952, pp. 694-98, 740; Ira O. Scott, Jr., *Monetary Policy, the Theory of Assets, and the Availability of Credit*, *passim* (doctoral dissertation, Harvard University, 1953); Robert V. Rosa, "Interest Rates and the Central Bank," *Money, Trade, and Economic Growth, Essays in Honor of John Henry Williams* (New York, 1951), pp. 270-95.

THE FACTOR PROPORTIONS PROBLEM IN UNDERDEVELOPED AREAS

By R. S. Eckaus*

The concepts "structural disequilibrium," "overpopulation," "technological unemployment" and "underemployment" appear frequently in the literature on underdeveloped areas and there is considerable discussion of the comparative desirability for use in such areas of relatively labor-intensive or capital-intensive techniques. This paper is intended to help clarify some of the underlying issues and to begin to provide a theoretical basis for their analysis.

Many of the underdeveloped areas of the world have large agrarian populations in which there is either persistent open unemployment or in which the marginal productivity of the working force is so low that it is commonly believed that withdrawal of a sizable fraction would not significantly affect output. This seems to be the case to varying degrees for much of Asia and the Middle East. Other countries, such as Italy, show persistent urban as well as rural unemployment or underemployment. It is a common feature of the unemployment in these countries that it fails to respond to fiscal policy measures designed to increase employment by stimulating effective demand. Use of conventional income-generating techniques appears in fact to create inflationary pressures and balance-of-payments difficulties long before full employment is approached.

This interpretation of the condition of many underdeveloped areas has led to the formulation of a number of alternative explanatory hypotheses which are presented in Section I. One of these hypotheses appears, at this stage of investigation, to be particularly fruitful in casting light on some of the outstanding characteristics of underdeveloped areas and is elaborated in Section II. Two approaches to the problems of empirical testing of the hypotheses are outlined in Section III.

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The hypotheses presented below suggest that the unemployment difficulties of underdeveloped areas are not basically due to lack of effective demand but stem from "market imperfections," limited opportunities for technical substitution of factors and inappropriate factor endowments.[1] The techniques of analysis of factor market imperfections are well known.[2] The implications of limited technical substitutability of factors were first analyzed by Abraham Wald[3] and more recently by the linear programming techniques.[4] Further development of the theoretical analysis in this paper consists mainly of an elaboration of geometrical techniques, which are used to apply the theory specifically to the problems of underdeveloped areas.

I. *The Factor Proportions Hypotheses*

The analysis which follows has grown out of the suggestion by C. P. Kindleberger that underdeveloped areas such as Italy are characterized by "structural disequilibrium at the factor level." This concept, formulated by Kindleberger and E. Despres, is identified as follows:

> Disequilibrium at the factor level may arise either because a single factor receives different returns in different uses or because the price relationships among factors are out of line with factor availabilities.[5]

This suggestion has been the starting point for two types of explanation of unemployment or underemployment in underdeveloped areas. The first type assumes that available technology would permit full use of the working force at some set of relative prices and finds the source of unemployment in various types of "imperfections" in the price system. The second type suggests that there are limitations in the existing technology or the structure of demand which lead to a redundancy of labor in densely populated, underdeveloped areas. The two types of hypotheses are combined in Section II to obtain a more general analysis.

[1] The hypotheses and analysis have come to be known at the Center for International Studies, M.I.T., as the "factor proportions" problem.

[2] *E.g.*, Joan Robinson, *Essays in the Theory of Employment*, 2nd ed. (Oxford, 1947), Ch. 2.

[3] A. Wald, "Über einige Gleichungssysteme der mathematischen Okonomie," *Zeitschr. f. Nationalökon.*, Dec. 1936, VII, 636-70; *cf.* also, W. L. Valk, *Production, Pricing and Employment in the Static State* (London, 1937), p. 58.

[4] *E.g.*, R. Dorfman, *Application of Linear Programming to the Theory of the Firm* (Berkeley, 1951). In an as yet unpublished paper ("Full Employment and Fixed Coefficients of Production") M. Fukuoka also related the assumption of fixed coefficients in production to the problem of unemployment.

[5] C. P. Kindleberger and E. Despres, "The Mechanism for Adjustment in International Payments—The Lessons of Postwar Experience," *Am. Econ. Rev.*, Proceedings, May 1952, XLII, 338.

A. *The Market Imperfections Hypotheses*

In the accompanying figure the vertical axis represents the rate of real wages and the horizontal axis the amount of labor. The curves *DD'* and *SS'* represent the aggregate supply and demand relations for a typical industry if factor markets are competitive. Under competitive conditions the wage rate would settle at *E*.[6]

Suppose, however, that trade union pressures, immobility of labor, government social legislation or other factor-market imperfections maintain the wage rate at *W* rather than allowing it to fall to *E*. The effective labor supply curve would be *WS'*. At the higher wage rate the demand for labor would not absorb all the labor available and it could be said, as Kindleberger does, that, *ceteribus paribus*, the wage rate does not represent factor endowments.

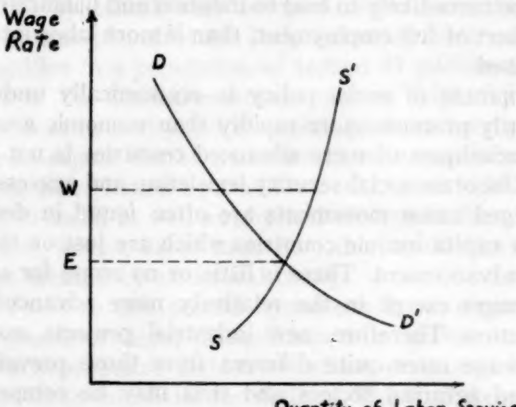

FIGURE 1

To isolate the influence of various types of imperfections let us now consider a case in which factor mobility, or lack of it, is not important and continue to confine the analysis to a closed economy. If the system had become adjusted to a particular complex of rigidities there would be no need for factor mobility in the absence of changes in techniques or tastes.[7]

[6] Fixed supply and demand curves such as those in Figure 1, suppose, of course, constant resources, technology and consumer tastes.

[7] "If effective demand always moved up and down in the same well-worn channels, a supply of each type of labor would always be ready waiting to meet demand for it, when effective demand expanded, and the question of mobility would not arise." Joan Robinson, *op. cit.*, p. 30.

The comparative use of the factors of production, depending as it does on the factor-price ratios and technology, would, however, reflect the "true availability" of labor only if wages were kept at E in Figure 1. If wages are kept at W there is an "artificially" high ratio of the price of labor to the price of capital. Since we are explicitly assuming that factor substitution is, in fact, possible, a structure of production may result with a higher capital-labor ratio than otherwise. If the diagram were representative of large parts of an economy, as output increased full employment of the given labor force would require the use of more capital than if the structure of production were adjusted to a lower labor-capital price ratio, unless the substitution effects were offset by increasing returns to scale. In a country in which capital was scarce and unemployment of considerable magnitude, the attempt to achieve full employment by use of relatively capital-intensive investment would be more likely to lead to inflation and balance-of-payments difficulties, short of full employment, than if more labor-intensive techniques were used.

The development of social policy in economically underdeveloped areas frequently proceeds more rapidly than economic growth. Imitation of the techniques of more advanced countries is not confined to technology. Elaborate social security legislation and aggressive government-encouraged union movements are often found in densely populated, low per capita income countries which are just on the threshold of economic advancement. There is little or no scope for such devices for raising wages except in the relatively more advanced and well-organized sectors. Therefore, new industrial projects may face the prospect of wage rates quite different from those prevailing in the handicraft and agrarian sectors and thus may be compelled to use different factor proportions. These considerations suggest that the foregoing analysis may be quite relevant for underdeveloped areas.

The next step in the analysis is to abandon the assumptions of constant technology and consumer tastes and to investigate the effects of changes in the composition of demand for goods and factors due to such influences as changes in methods of production or in the directions or levels of demand as a result of changes in tastes or foreign competition. In this second case, as the level of aggregate effective demand rises, goods will be demanded in different proportions than formerly and the location and magnitudes of the demand for factors of production will shift. If labor is not mobile, or if it takes considerable wage increases to shift it, then factor disequilibrium such as depicted in Figure 1 for the preceding case of constant tastes and technology would develop in certain industries. An increase in the level of effective demand would push other industries to the limits of capacity relatively quickly in

this second case. Money wages and prices would begin to rise, not uniformly but in the "bottleneck" sectors, prior to the achievement of general full employment. New investment in these sections would tend to increase still further the substitution of capital for labor while offsetting tendencies in the relatively stagnant sectors would work slowly, if at all. The balance of payments under the pressure of growing domestic inflationary pressures and increased demand for capital imports would tend also to develop deficits at an earlier stage in the expansion of national income. This could all be superimposed upon and could aggravate the "factor disequilibrium" previously discussed. It would be distinguishable, however, as there would be evidence of excess capacity and stranded capital-goods resources indicating an original misallocation or a structural shift.

There is at least superficial evidence to suggest that the factors stressed in this hypothesis may be operative in some underdeveloped countries. For example, although Italy has a persistent unemployment of about 2 million in a population of around 47 million, there are also some sectors of the Italian economy, such as shipbuilding, in which there is persistent unused physical capital plant and equipment. Moreover, we would expect that in underdeveloped areas the working force would be even more bound by tradition, reluctance to change location and barriers to social as well as physical movement than is the case in more advanced, industralized countries; this would also contribute to the problems created by structural change.

Closely related to this second hypothesis is an explanation which locates the source of factor disequilibrium in barriers to the entry of new firms into profitable industries whose expansion is limited by various types of monopolistic restrictions. This and the other types of "imperfections" could aggravate the "factor disequilibrium."

One further related hypothesis remains to be considered here.[8] Suppose that, whatever the actual characteristics of the production function and degree of technical substitutability of factors, businessmen believe that they face a production function with constant coefficients, *i.e.*, no factor substitution is possible. Indian businessmen, for example, may believe that the "American way" of producing is the best and only way and that this always involves high ratios of capital to labor. Plant engineers accustomed to emulating "Western" technology may not be sensitive to the range of choice actually available in manufacturing processes and may impose unnecessary technical constraints on managers in underdeveloped countries. Thus in Figure 2, although the solid lines, x_1, x_2 . . . may represent the real contours of

[8] I am indebted to F. M. Bator for the suggestion of this case.

the production function, businessmen may regard the dashed lines x_1', x_2' . . . as the ones along which they must move.

In this case the expansion path P would be independent of the factor-price ratios, and, therefore, of the supply curve of labor such as indicated in Figure 1. Expansion of effective demand would tend to run into the limits imposed by capital capacity prior to the achievement of full employment with consequent inflationary tendencies and balance-of-payments difficulties. This could take place even if Figure 2 were not characteristic of all sectors of industry.

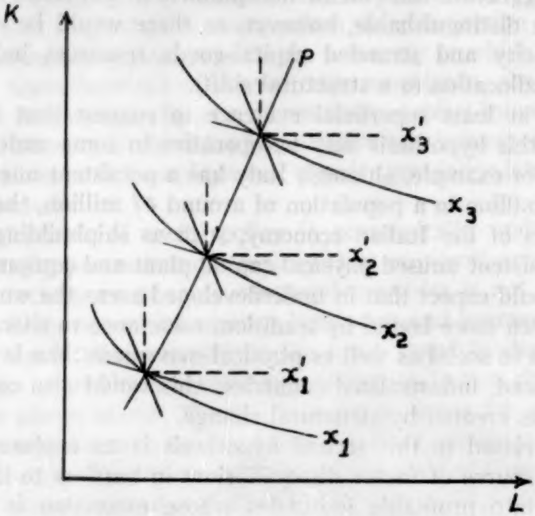

FIGURE 2

B. *The Technological Restraints Hypothesis*

It is fairly common for observers to report finding modern, capital-intensive equipment and techniques used in underdeveloped areas where relative factor prices would suggest the use of more labor-intensive techniques. I should now like to suggest that the use of the "modern" techniques is not necessarily irrational emulation but the result of real limitations in the technological choices available, and that this, in turn, is a major source of labor employment problems in underdeveloped areas. At this point the exposition will be oversimplified to indicate in stark outline the nature of the argument. In the next section the hypothesis will be combined with some of the market imperfections hypotheses in an attempt to describe some of the major characteristics of underdeveloped and overpopulated areas by the use of a relatively simple theoretical framework.

The basic assumptions of the following analysis are: (1) in large sectors of an economy there are only a few alternative processes which can be utilized; (2) these processes are relatively capital-intensive.[9] There have been frequent comments which describe certain features of underdeveloped and overpopulated areas as essentially the result of limited variability in the coefficients of production. An example of this kind of comment is the frequently observed "underemployment" in agriculture, where this is taken to mean that, with agricultural techniques remaining unchanged, withdrawal of farm labor would not reduce output.

The Case of One Good, Two Factors and One Process. In the first, most simple case to be considered, suppose that only one good is produced in the economy, national product, which requires two factors,

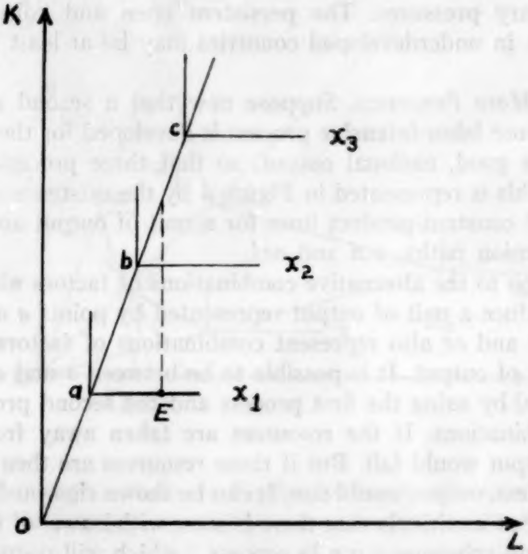

FIGURE 3

capital and labor.[10] Assume also that only one process can be used to produce national product, *i.e.*, that the factors must be used in fixed proportions. This situation is represented in Figure 3, where the heavy

[9] A production "process" is a way of combining different factors of production whose *proportions* are determined by technology, although the *scale* of production and thus the absolute quantities of the factors used may be freely variable.

[10] Confining the analysis to only two factors is not essential but highly convenient for geometrical demonstrations.

black line represents national output, x_1 of 1 unit; the lighter lines represent higher outputs. Quite irrespective of relative factor prices, points *a, b, c,* etc., represent the combinations of factors which will be used to produce output and the slope of the line joining these points is equal to the constant, capital-labor ratio.

Only when the factors of production are actually available in proportions equal to the fixed capital-labor ratio is there the possibility that both can simultaneously be fully utilized. If the actual factor endowment is off the line *oabc,* for example, at point *E,* there must inevitably be some unemployment of labor which is not amenable to any fiscal or monetary policy for its alleviation. Labor is a redundant factor and only by increasing capital stock in the amount indicated by the length of the dashed line can the unemployment be eliminated.[11] Conventional compensatory fiscal policy would, in this case, only result in inflationary pressures. The persistent open and "disguised" unemployment in underdeveloped countries may be at least partially of this kind.

Two or More Processes. Suppose now that a second and a third relatively more labor-intensive process is developed for the production of the same good, national output, so that three processes are now available. This is represented in Figure 4 by the existence of two more right-angled constant-product lines for a unit of output and two additional expansion paths, *ocd* and *oef.*

In addition to the alternative combinations of factors which may be used to produce a unit of output represented by points *a* and *c* and *e,* the lines *ac* and *ce* also represent combinations of factors which will yield a unit of output. It is possible to be between *a* and *c* on line *ac,* for example, by using the first process and the second process in different combinations. If the resources are taken away from the first process, output would fall. But if these resources are then used in the second process, output would rise. It can be shown rigorously[12] and may be appreciated intuitively that there is some withdrawal of factors from process 1 and subsequent use in process 2 which will restore output to the unit level. Correspondingly the line *bd* represents combinations of process 1 and process 2 and of the two factors capital and labor which are optimal for the production of the x_2 level of output.[13]

[11] I recognize that it is stretching a definition considerably to call redundant factors "unemployed." However, since it is specifically the hypothesis of this paper that the labor called "unemployed" or "underemployed" in underdeveloped areas is redundant, I shall, with this warning, use the terms interchangeably.

[12] *Cf.* Dorfman, *op. cit.*, pp. 39-41.

[13] It can be seen by drawing a line from *a* to *e* that, for any output, any combination involving processes 1 and 3 would require more of at least one factor than a combination of processes 2 and 3.

In this second case where several processes are available the proportions in which the two factors can be used are not confined to either the expansion path of the first process or the expansion path of the second process, or both, but may be any place within the area bounded by *oab* and *oef*. Thus the factor endowment E_1, while inevitably implying some unemployment of labor when only the first process was available, can now be fully utilized by using the first process on a smaller scale and switching some of the capital to the second process. If, however, the factor endowment should be outside the area bounded by the

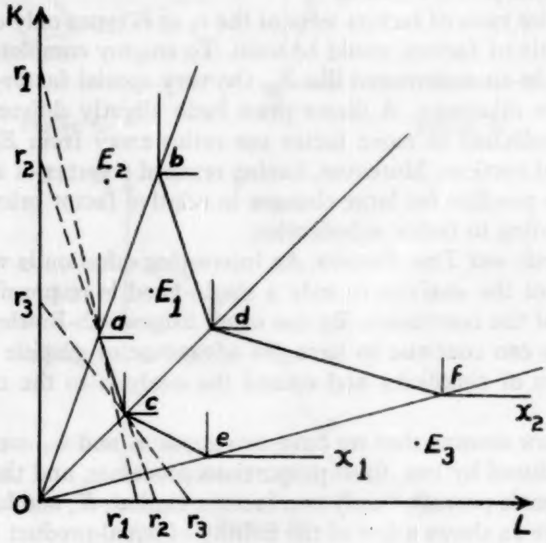

FIGURE 4

two expansion paths, at E_2 or E_3, for example, structural unemployment of capital capacity or of labor would ensue in exactly the same manner as in the preceding case of one process, regardless of factor-price ratios or fiscal policy.

If more than two processes are available to the economy, full employment of all factors will be *possible* at a nonzero wage so long as the proportions in which factors are endowed fall on or within the limits set by the processes with the most extreme factor-use ratios. This suggests an observation which is, by now, almost trite: reduction of underemployment in overpopulated areas requires the addition of scarce factors. This may, however, be accomplished in a variety of ways, such as the use of dry farming methods and drought- and heat-resistant hybrids which increase the land available for farming.

In the case in which just one process is available, changes in relative factor prices can not affect the proportions in which factors are used. This is not true when there are two or more processes available. In this case factor proportions employed will, in competitive markets, vary with factor prices and the achievement of full employment, if technologically possible with the given factor endowment, will depend on factor prices. In Figure 4, r_1, r_2 and r_3 are constant-expenditure lines illustrating three possible sets of factor prices. The line r_2 has the special feature that its slope is equal to that of the constant-product curve between points *a* and *c*.[14]

If the price ratio of factors were of the r_1 or r_3 types only one process and one ratio of factors would be used. To employ completely each of the factors in an endowment like E_1, the very special factor-price ratio r_2 would be necessary. A factor-price ratio slightly different from r_2 would be sufficient to move factor use ratios away from E_1 to one of the isoquant vertices. Moreover, having reached a vertex of an isoquant it would be possible for large changes in relative factor prices to occur without leading to factor substitution.

Two Goods and Two Factors. An interesting question is whether the restriction of the analysis to only a single good is responsible for the character of the conclusion. By use of an Edgeworth-Bowley type box diagram we can continue to have the advantage of graphic techniques without loss of simplicity and extend the analysis to the case of two goods.

Let us now assume that we have two goods x_1 and x_2, each of which can be produced by two, fixed-proportions processes, and that constant returns to scale prevail;[15] only two factors, capital, K, and labor, L, are used. Figure 5a shows a few of the infinity of equal-product lines which could be drawn for different outputs of the two goods. The solid lines refer to product 1, the dashed lines to product 2. In Figure 5b, these isoquants are used to construct a box diagram. The dimensions of each side of the box represent the total amount of factors available. Any point within the box simultaneously represents four quantities: the amount of capital and the amount of labor used in producing x_1 which is determined by measurement from the lower left-hand corner, and the amount of capital and the amount of labor used in the x_2 industry, measured from upper righthand corner.

Figure 5b provides the basis for the derivation of the "efficiency

[14] Constant expenditure lines r_4 and r_5 could be drawn analogously to r_2 and r_3, with a slope equal to that of *ce*, and less than that of *ce*, respectively.

[15] The assumption of constant returns to scale is, of course, maintained not because it is considered the best description of reality but for its analytical convenience. Some comments on the effects on the analysis of dropping this assumption are made below, p. 556.

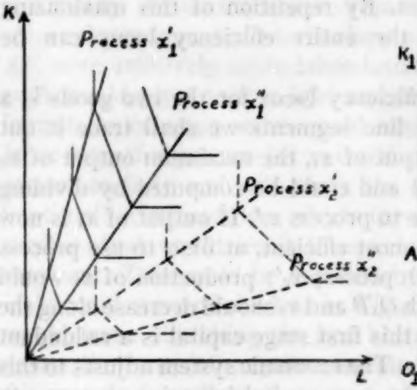

FIGURE 5A

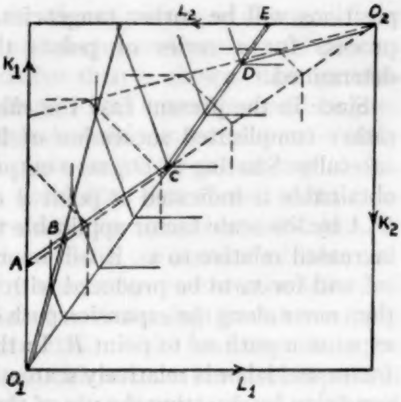

FIGURE 5B

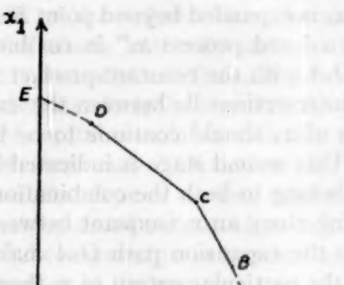

FIGURE 5C

locus" for the two goods x_1 and x_2. If production takes place at any point off this locus, it is possible by recombination of factors to produce more of one good without diminishing the output of the other. If along the efficiency locus corresponding amounts of the two goods are read off and plotted on a chart as in Figure 5c, the transformation or production-possibility curve between x_1 and x_2 is obtained.

To locate a point on the efficiency locus we must specify a particular amount of x_1 to be produced and find the maximum of x_2 which can simultaneously be produced. Graphically, we must move along the specified x_1 isoquant crossing x_2 equal-product lines until we reach the highest x_2 isoquant obtainable. The optimum positions achieved will thus be located at tangencies of the x_1 and x_2 equal-product lines where the lines just touch without crossing. Since, in the present case, each equal-product line is made up of segments of straight lines, the optimal

positions will be corner tangencies. By repetition of this maximizing process for a series of points the entire efficiency locus can be determined.

Since in the present case the efficiency locus for the two goods is a rather complicated succession of line segments we shall trace it out carefully. Starting at O_1, zero output of x_1, the maximum output of x_2 obtainable is indicated at point A and could be computed by dividing O_2A by the scale factor applicable to process x_2'. If output of x_1 is now increased relative to x_2, it will be most efficient, at first, to use process x_1' and for x_2 to be produced with process x_2'; production of x_1 would then move along the expansion path O_1B and x_2 should decrease along the expansion path x_2' to point B. In this first stage capital is a redundant factor and labor is relatively scarce. The economic system adjusts to this condition by directing the use of the most capital-intensive processes to be used for the production of both goods.

As production of x_1 is expanded beyond point B it would be best now to use both process x_1' and process x_1'' in combinations indicated by the intersection of O_2A with the constant-product lines for commodity x_1 as long as these intersections lie between the expansion paths of x_1' and x_1''; production of x_2 should continue to be by means of process x_2' alone, however. This second stage is indicated by the points on the segment BC which belong to both the combination of x_1' and x_1'' and process x_2'. By tracing along an x_1 isoquant between B and C it can be seen that shifting to the expansion path O_2A makes possible a larger production of x_2 for the particular output of x_1 than if we had remained on the path O_1B. As production of x_1 is expanded in this stage and production of x_2 is decreased, capital becomes more scarce relative to labor due to the relatively high labor-capital ratio of the resources released by the decrease in production of x_2.

In the third stage, as output of x_1 is farther increased, it is most efficient to use only process x_1''. But now for any given output of x_1, the maximum amount of x_2 can be obtained by use of the more labor-intensive process x_2'' in combination with process x_2'. The third stage on the efficiency locus is indicated by line CD.

Finally, still further expansion of production x_1 continues to be best done along the expansion path of process x_1'' until, at point E, x_1 is being produced to the complete exclusion of x_2 In this fourth and final stage the output of x_2 should be produced only by process x_2''.

Only in the fourth stage and the first stage of the efficiency locus would optimum allocation imply some unemployment of one of the factors. In the first stage the unemployment of capital for different outputs of x_1 and x_2 is indicated by the vertical distance between lines AB and O_1B. In the final stage the unemployment of labor is measured by the horizontal distance between lines DE and DO_2.

Actually the occurrence and qualitative significance of any of the stages depends on both technology and factor endowments. If process x_1'' were relatively more labor-intensive than is shown, its expansion path would pivot to the right and stage 2 in Figure 5b would be prolonged. As common sense would suggest, development of a sufficiently labor-intensive process for x_1 could cause stages three and four to disappear entirely and with them the possibility that there could be an "optimal" configuration which involved unemployment of labor. A similar effect would result from a decrease in the amount of labor endowment. This could be depicted by squeezing together the left- and right-hand sides of the box in Figure 5b. Increasing the labor supply would mean stretching the box horizontally. This would not only increase the range of outputs associated with stage 4 but also, if pushed far enough, first eliminate stage 1, the capital unemployment stage and then stage 2.

The points *ABCDE* on the technical transformation curve in Figure 5c correspond to the similarly lettered points on the efficiency locus in Figure 5b.[16] At first when only a little x_1 is produced and, relatively, a lot of x_2, we should move along the segment *AB* using process x_1' and x_2'. Unemployment of capital associated with this segment on Figure 5b will be reduced as we approach *B*. Relative labor scarcity is limiting along this segment and the slope of the line segment *AB* will depend on the ratio of the labor inputs of output of x_2 to x_1. The relative labor intensity of process x_2' compared to process x_1' as drawn on Figure 5a accounts for the steepness of the segment.

The line segment *ED* on Figure 5c has an exactly analogous justification to that for the segment *AB*. Labor unemployment will be reduced as *D* is approached from point *E*. Capital is the only scarce factor and the relative capital intensity of process x_1'' as compared to process x_2'' accounts for the flatness of *ED*.

Point *C* is located conveniently relative to points *B* and *D*. More of x_1 is produced at *C* than at *B*, though not so much more as produced at point *D*. Likewise less x_2 is produced at *C* than at *B* though not as much less at *D*. The segments *BC* and *CD* will be straight lines as can be verified by noting in Figure 5b that, due to the assumption of constant returns to scale in all processes, there must be a constant ratio between changes in output of x_2 along the line O_2A between *C* and *B*, for example, and changes in output of x_1.

It was pointed out with regard to the efficiency locus in Figure 5b that changes in factor endowment and technology could shorten, extend

[16] In the constant-returns-to-scale case, only relative factor endowments are important in determining the *shape* of the transformation curve. If the absolute factor endowments were changed while relative factor endowments remain constant, it would amount to sliding the northeast and southwest vertices of the box on the connecting diagonal.

or even completely eliminate various stages of the efficiency locus. This applies also to the separate segments of the technical transformation curve. The technical transformation curve of Figure 5c illustrates all the possible stages which could be produced by this simple case, from unemployment of capital to unemployment of labor. It should not be presumed that this range of possibilities will actually exist in a particular system at any one time. Rather, it is the hypothesis of this paper that technology and factor endowments in underdeveloped areas are such that a segment like *DE*, in which labor is redundant, is important in their transformation curves.

To demonstrate the importance of demand conditions for employment when the conditions assumed in the present hypothesis exist, we shall draw a transformation curve in Figure 6 consisting only of stage

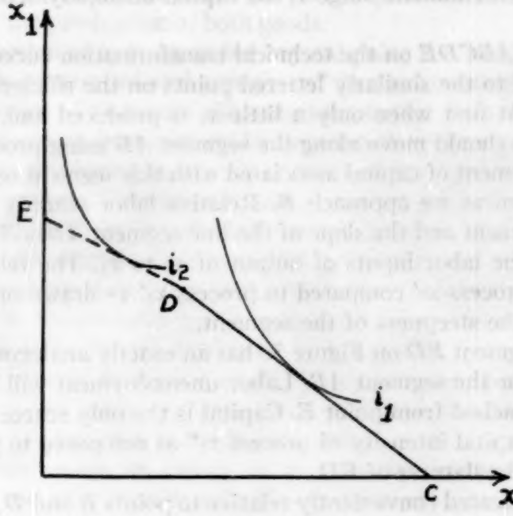

FIGURE 6

CD, along which there is full employment of both capital and labor, and the labor-redundant stage *DE*. This can be envisaged as the result of a high rate of population growth which has stretched the labor axis very far. We can now see that actual achievement of full employment depends on the relative demands for the two goods. Market baskets whose composition falls along *CD* will allow full employment; along *DE* labor will be redundant. A geometrical demonstration which is suggestive, though lacking in rigor can be given. Suppose that the lines i_1 and i_2 represent two different possibilities for the community's indifference curve for the two goods. Only in the case in which the in-

difference curve is tangent along CD will optimal output imply full employment. The community must face a conflict in goals between full employment and maximum value of output if i_3 is in fact its indifference curve.[17] Extending the analysis to include many goods would widen the range within which factor endowments could vary without unemployment of one or more factors resulting. There would, however, still be no guarantee that the composition of goods demanded would always hit on a full-employment point.

It may also be observed that if it is possible to buy and sell in foreign trade at price ratios between the slopes of CD and DE, full employment would again be possible though not necessary. To determine whether or not it would result, it would be necessary to know the reciprocal demands for exports and imports.

It would be possible to elaborate this model now by investigating the implications for the analysis of market imperfections such as were considered in the previous section. This extension will be postponed to the following section, however, and applied to a model of underdeveloped areas designed to be somewhat more realistic. As it stands the present analysis gives us, I believe, important insight into the problems of underdeveloped areas. It presents a hypothesis which helps account for the inflationary tendencies of underdeveloped areas under the impact of programs designed to raise effective demand, and for the stubbornness of unemployment in such areas.

The analysis of this section also provides a more precise definition for the "technological unemployment" mentioned in *Measures for the Economic Development of Underdeveloped Countries.*[18] Technological unemployment may be a real problem for underdeveloped areas if it is defined, as in this section, as redundant labor arising from resource and technological restraints and the structure of demand.

II. *A Model of Underdeveloped and Overpopulated Areas*[19]

Though the analysis of the previous section is suggestive, it is hard to believe that all of the unemployment and underemployment in underdeveloped areas represents literally uselss labor. Moreover, the assumption of only a few alternative processes and a quite limited range for

[17] A major qualification to this analysis, still on the static level, is the possibility that the shape and position of the community indifference curves might not be independent of the particular processes or combinations of processes which are used. To handle this difficulty it would be necessary to determine the shifts in income distribution which result from changes in factor prices and to explore the differentials in tastes of the recipients of the different types of income.

[18] United Nations, Department of Economic Affairs (New York, 1951).

[19] I am particularly indebted to P. N. Rosenstein-Rodan for discussion of the issues raised in this section.

substitution of factors does not seem to fit well the technological characteristics of a number of important industries, as, for example, agriculture. I shall attempt therefore to move toward greater realism by use of a two-sector model (one section with fixed, and one with variable coefficients of production), and investigation of the effects of market imperfections in such a system. To the assumption of limited opportunities for substitution in some industries is added the hypothesis that in many other industries there is a considerable range of variability in the proportions in which factors can be used.

It will be useful to initiate the discussion under the assumption that each of the two sectors produce the same product. Suppose that in Figure 7 the constant-product lines of the fixed-coefficient industry are represented by the lines x_1, x_2, ...[20] and the constant-product lines of the variable coefficient industry by the lines x_1', x_2' . . . .

The output x_1 could be produced by the factor combination and technique represented by point 1 or any of the factor combinations using the variable proportions technique represented by the line x_1'. Moreover, following the reasoning on page 546 above, it is also possible to produce x_1 by simultaneously using both the fixed-coefficients and variable coefficients techniques. All of the lines which could be drawn from point 1 to line x_1' represent a *combination* of methods which would produce output x_1; all such lines fall between the lines 1*a* and 1*b* which are drawn from point 1 just tangent to line x_1'.[21] The "efficiency locus" for specified outputs can be traced out by determining, for given amounts of one of the factors, the minimum amount of the other factor necessary to produce the output. If this is done for output x_1 when very little labor is available it is best to produce by the use of the variable coefficients process alone; a representative factor use for this case is at point *p*. As more labor becomes available the minimum amount of capital required to produce x_1 is found by sliding down the variable coefficients constant-product line to point *a*. Line *a*1 represents different combinations of the variable-coefficients technique located at *a* and the fixed-coefficient process. When the labor available is further increased, the minimum amounts of capital necessary to produce x_1 are found by moving along line *a*1. As labor available is still further increased the line 1*b* is the next segment of the efficiency locus used, for reasons analogous to those given for the use of segment *a*1. Finally, when labor

[20] Although the constant-product lines for the fixed-coefficients sector are drawn in Figure 7 as if only one process is available, the demonstration is perfectly general and its implications are applicable when more than one process is available for the fixed-coefficient industry.

[21] I am indebted to R. Solow for the criticism of a previous paper which led to this formulation.

is increased beyond the amount available at point b, again only the variable coefficients method should be used to produce x_1.

Output x_1 could also be produced by process combinations and amounts of factors which do not lie on the efficiency locus, of course. Line $p1$ represents a series of such combinations, using in varying proportions the variable coefficients techniques located at p or n and the fixed-coefficient process located at point 1. Any combination of methods along $pn1$, however, would result in higher costs for x_1 than a method found on the efficiency locus; methods along $pn1$ could also be used to

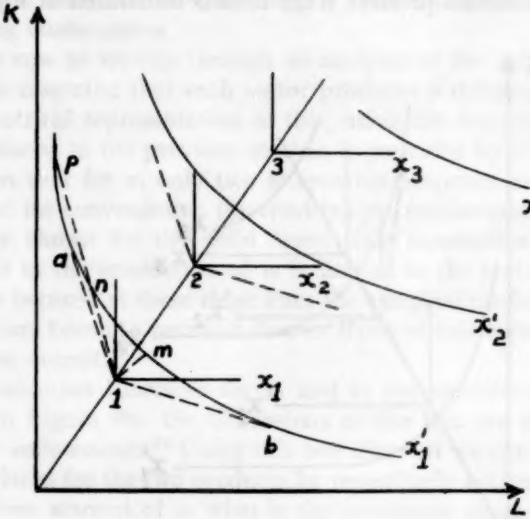

FIGURE 7

produce larger amounts than x_1. Of course, many lines like $pn1$ could be drawn between $a1$ and the vertical portion of the fixed-coefficient x_1 isoproduct line and, analogously, between $1b$ and the horizontal portion of the fixed-coefficient isoproduct line. Lines like $1m$, of which many could also be drawn, represent combinations of methods which would also produce x_1, but require more of *both* labor and capital than points on the efficiency locus. The boundaries of lines such as $1m$ are the vertical and horizontal portions of the fixed-coefficients x_1 isoproduct line.

Figure 7 embodies the constant-returns-to-scale assumption for both the fixed-coefficients and variable-coefficients method. This is not necessarily the most realistic or relevant assumption, however, nor does the relative position of the two types of curves, or the shape of the variable-coefficients isoquants necessarily correspond closely to reality. It is

useful to recognize other, special cases which may have important empirical significance. In Figure 7, for example, only the extremes of the isoproduct curves of the variable-coefficients technique were a part of the efficiency locus for any particular output, and, as drawn, relatively little substitution was possible at such extremes. It would, of course, be possible to draw figures in which the "efficient" isoproduct ridge lines follow the variable-coefficients lines so as to allow substitution of factors over a considerable range.

The effect of divergent rates of return to scale on the shape and slope of the constant-product ridge lines is illustrated in Figure 8 for

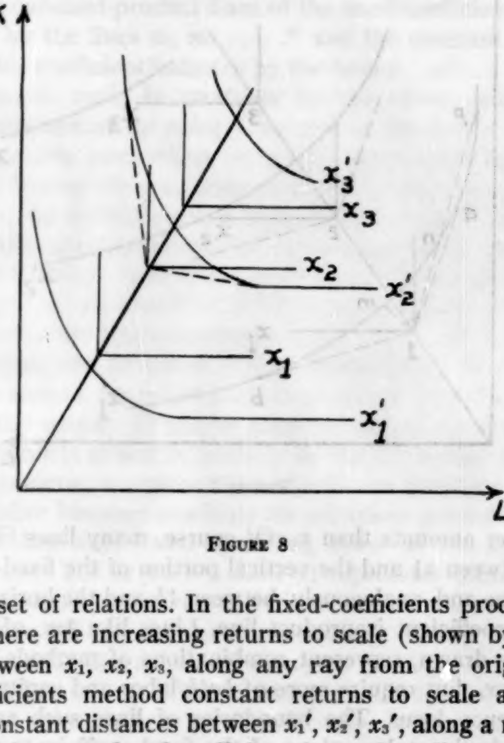

FIGURE 8

one possible set of relations. In the fixed-coefficients process it is assumed that there are increasing returns to scale (shown by decreasing distances between x_1, x_2, x_3, along any ray from the origin). In the variable-coefficients method constant returns to scale are the rule (shown by constant distances between x_1', x_2', x_3', along a ray from the origin). In this example, the efficient isoproduct lines change their shape as output is increased. For output x_1 only the variable-coefficients constant-product line is relevant. For output x_2 the "efficient" isoproduct ridge line involves use of both the fixed and variable-coefficient techniques. Finally, for output x_3, only the fixed-coefficient technique is "efficient" and the ridge lines involving the variable-coefficient method necessarily have a positive slope.

Figure 8 provides the formal basis for some useful deductions. Changes in factor prices which might at one scale of output induce shifts in the proportions in which factors are used, may not induce such shifts at another scale of output or may only produce smaller shifts. Likewise techniques of production not feasible at one scale of production may become mandatory for efficiency at another scale.

In Figures 6, 7 and 8 it is particularly clear that in order for the system to travel along its most efficient production isoquant it is necessary that factor prices be flexible. Factor price rigidities would make parts of the efficient constant-product lines unattainable for profit-maximizing businessmen.

We can now go rapidly through an analysis of the two-sector model hypothesis assuming that each sector produces a different commodity. The geometrical representation of this, using the box diagram technique introduced in the previous section, is provided by Figure 9a. The assumption that for x_1 only two alternative processes are available is maintained for convenience; the resulting production-possibility curves for x_1 are shown by the solid lines. The assumption of variable-coefficients in the production of x_2 is limited to the sector between its ridge lines because at these ridge lines the marginal productivity of one of the factors becomes zero and further input of this factor would have no effect on output.[22]

The production functions for x_1 and x_2 are reproduced in the box diagram in Figure 9b: the dimensions of the box are determined by the factor endowments.[23] Using this box diagram we can trace out the efficiency locus for the two products by repeatingly asking the question, "For a given amount of x_1 what is the maximum amount of x_2 which can be produced?" In the process of tracing out the efficiency locus, the transformation curve can be drawn for the two goods.

Starting at O_1, zero output of x_1, the maximum amount of x_2 producible is given by O_2A. If the output of x_1 is increased relative to x_2, it would be most efficient at first to use process x_1' for x_1 and to produce x_2 by traveling along its most capital-intensive ridge line, O_2A. This represents optimal behavior up to point B. In this stage although both products are being produced capital is a redundant factor. This results in spite of the variability of coefficients in production of x_2 because outside the upper ridge line of x_2 capital has zero marginal productivity. Stage 1 is represented on the transformation curve in Figure 9c as segment AB.

[22] It is assumed that there is no disposal problem and, thus, that the production isoquants do not bend back on themselves.

[23] Again only the ratio of the factor endowments is important as long as constant returns to scale is assumed.

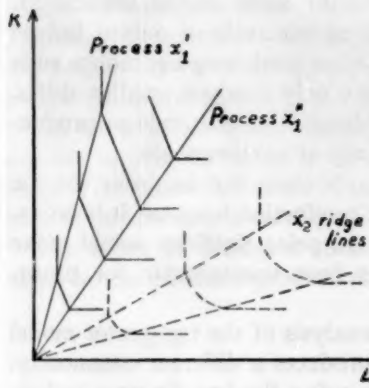

FIGURE 9A

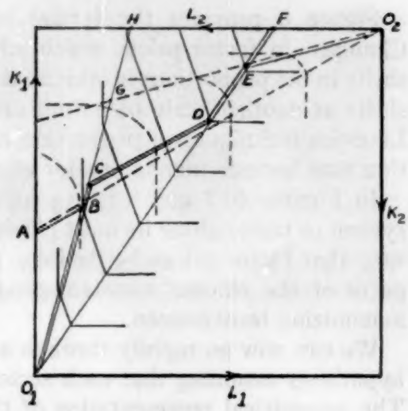

FIGURE 9B

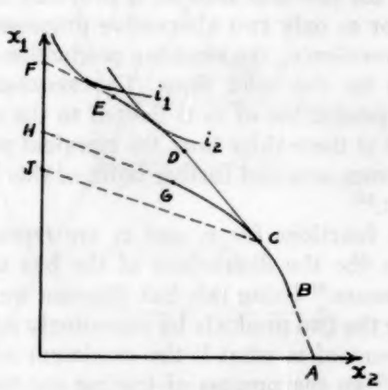

FIGURE 9C

The efficiency locus from B to C is traced out by finding the succession of points at which the x_1 constant-product curves touch the highest x_2 constant-product curves. In this stage process x_1' will be used for x_1 and a varying combination of factors for x_2. The segment of the transformation curve for this stage, BC, will be curved as equal increases in production of x_1 along x_1' will not result in constant changes in output of x_2. Only along rays from the origin O_2 will equal distances imply equal differences in output of x_2. BC will be concave to the origin as is "normal" for transformation curves; graphically it can be seen that smaller and smaller changes along x_1' are needed in order to move across equal changes in output of x_2. As production moves from B to C the points at which x_1' corners touch the x_2 isoquants will be characterized by smaller and smaller slopes on the x_2 isoquants, corresponding to the

decreasing capital-labor ratio used in the production of x_2. At some point, C, the capital-labor ratio in x_2 will become equal to the capital-labor ratio represented by the negatively slanting portion of the x_1 isoquants. A ray from the origin O_2 to point C will intersect every x_2 isoquant at a point with identical slopes. Thus CD, the third stage of the efficiency locus and the transformation curve, will be the series of tangencies of the negatively slanting portion of the x_1 isoquants, representing combinations of processes x_1' and x_1'' and the x_2 isoquants along the ray O_2C. The segment of the transformation curve corresponding to CD lies on a ray from O_2 and thus the equal jumps across the x_1 isoquants will mark out constant changes in production of x_2.

At point D and for further increases in output of x_1 relative to x_2 it would be best to use only process x_1'' for production of x_1. The segment of the transformation curve, DE, corresponding to DE on the efficiency locus, is curved for reasons similar to those which created the curvature of segment BC.

The final stage of the efficiency locus is the labor unemployment stage. The marginal productivity of labor has fallen to zero in the x_2 sector and in a perfect factor market wages would fall to zero. EF represents this final stage on the transformation curve in Figure 9c.

ABCDEF in Figure 9c is the full transformation curve for this case. There are now curved as well as straight-line segments, and the kinks characteristic of the previous transformation curves have disappeared.[24]

In Figure 9b, as in Figure 5b, it is possible to visualize the effects of structural changes by altering the shape and position of the production isoquants for each product and the dimensions of the box.

The box diagram approach helps to clarify the implication of the differences in substitutability in the fixed-coefficient and variable-coefficient sectors. It is clear that the outputs at which one or another factor becomes redundant will be determined by the limits of substitution in the variable-coefficients sector and the most extreme labor- and capital-intensive processes in the fixed-coefficient sector, not by the discontinuities of the latter sector. These have other important effects, however.

Suppose that the respective demands for output are such that a large part of the available capital is drawn into the capital-intensive and fixed-coefficient sector. The amount of labor which can be absorbed in these sectors is dependent on the amount of capital available. Since capital is a scarce factor, labor employment opportunities in this sector are limited by its availability rather than by demand for output.

[24] Being off the efficiency curve, it may be noted is like being on an isoquant $1m$ in the single-good case. *Cf.* Figure 7 above.

The relatively plentiful labor supply is then pushed into the variable-coefficient sector and absorbed there as long as the marginal value productivity of labor is higher than the wages it receives.

In this case, as in the models of the preceding sections, unemployment is not due to lack of effective demand and as a result cannot be relieved by conventional contracyclical economic policy designed to stimulate spending. If employment opportunities in the fixed-coefficient sectors were limited by capital scarcity or some other resource bottleneck, an increase in demand rather than stimulating additional output would only create inflationary pressures. Likewise, in the variable-coefficient sectors if the marginal productivity of labor were zero, the first effects of an increase in demand for output would be an increase in prices without an increase in production. If more of the scarce factors were made available to the fixed-coefficient sectors, more labor could then be employed and would be used, if there were an effective demand for its output. Additional amounts of the scarce factors in the variable-coefficients sector would also increase labor productivity and output if demand were adequate.

It is possible in this case of two sectors, one of fixed and one of variable coefficients, for a divergence to exist between the full-employment output and the output with maximum value, just as in the case of fixed-coefficient processes for each of two goods, as depicted in Figure 6 above. This could result even if there were no market imperfections. If, in Figure 9c, the community indifference curves were like i_1 rather than i_2 so that the tangency occurred in the capital-scarcity, labor-surplus stage, the divergence could exist. On the other hand, community indifference curves shaped like i_2 would mean that it would be possible for full-employment output and maximum-value output to be identical. This demonstration is subject to the same qualifications applied to the one-good case.

Without empirical knowledge, it is not possible to evaluate certainly the relative importance of each of the stages of the transformation curve 9c. However, according to the hypothesis advanced here the transformation curve for underdeveloped areas would consist mainly of the high labor-intensity and labor-unemployment segments such as *DE* and *EF*.

We have thus far in this section assumed the existence of competitive markets and profit-maximizing entrepreneurs. We have shown that, even under such assumptions, technology, factor endowments and final demands may combine in ways which make it very difficult for underdeveloped areas to solve their problems of unemployment and underemployment. It is possible now to broaden the analysis by combining it with the analysis of the effects of market imperfections discussed in

Section I to determine what further problems are created when some of the assumptions of competition are dropped.

Behind the transformation curve lie many fine adjustments as factors are shifted from one industry to another and recombined in varying proportions to obtain the maximum output from one industry for given outputs of the other industry. It has been assumed in deriving the transformation curve that the necessary adjustments would be accomplished as they would be in a perfect factor market. But flexibility within wide limits is required to achieve every possible position on a transformation locus such as that in Figure 9c. When imperfections and rigidities of various types obstruct the movements of factors and prices, the system will not be able to achieve its optimum transformation curve but will instead do no better than to move along some other, less than optimal curve. Limited factor-price flexibility may be quite serious when at least one good is produced with fixed-coefficient processes. If rigid factor prices render a relatively labor-intensive process unprofitable, the only alternative process may involve a big jump to a quite capital-intensive process as well as a drastic obstacle to substitution in the variable-coefficients process.

Since we are interested in the effect of imperfections in the factor markets, it will be useful to distinguish transformation curves which assume perfect adjustments in the factor markets; these will be called "technical transformation curves." Transformation curves which take into account market imperfections will be different from the technical transformation curves; these latter relations will be designated "market transformation curves."[25] Different types of market imperfections will create different types of shifts away from the technical transformation curve, so there is not one market transformation curve for each technical transformation curve but many.

It may help to approximate reality to assume that factor-price ratios in the variable-coefficients sector are relatively more flexible than those in the fixed-coefficients sector. This might result from differential strength of union organization or susceptibility to government wage controls. Suppose, for example, that by means of union pressures or minimum wage legislation real wages of labor were maintained so that in the fixed coefficients sector the labor-capital price ratio was set above that represented by the slope of the constant product curve combining processes x_1' and x_1'' in Figure 9b; the factor-price ratio in

[25] The effect of factor-market imperfections in shifting the market transformation curve inside the technical transformation curve has been pointed out and analyzed for international trade by G. Haberler, "Some Problems in the Pure Theory of International Trade," *Econ. Jour.*, June 1950, LX, 223-40 and by P. Samuelson, "Evaluation of Real National Income," *Oxford Econ. Papers*, Jan. 1950, II (N.S.), 18-19 for welfare economics; others have probably also noted the effect.

the variable coefficients sector may still be assumed to vary freely. The cost-minimizing combination of factors is determined for any particular output at the point at which the production-possibility schedule for that output touches the lowest expenditure line. If the production-possibility schedule has any slope at this point, it is a condition of equilibrium that this slope be equal to the factor-price ratio which determines the slope of the expenditure line. As a result under the present assumptions process x_1'' would never be used. It would always be more profitable to use process x_1' alone in producing x_1. The transformation curve would be *ABCGH* in Figure 9c; this is below the technical transformation curve and has a much longer range of unemployment. If both sectors were characterized by such high, inflexible factor-price ratios, the economy's transformation curve would approach *ABCJ*.[26]

Barriers to the movement of factors would have the effect of moving the market transformation curve even further inside the technical transformation curve and increasing the range over which a factor is redundant.

Thus imperfections in factor markets have several undesirable effects. They reduce the amount of goods available and create a wider range of combinations of goods over which labor may become unemployed, depending on the structure of final demand.

Although the effects of rigid wages on the transformation curve of the economy are clear, welfare judgments as to the results of removal of the factor-price rigidities are subject to the same qualifications as in the previous case. Much depends on the effects of a change in methods on the income distribution and, via income distribution, on community preferences.

III. *Empirical Verification*

The analysis above is based on hypotheses which can be tested empirically and which deserve to be given factual content. Empirical testing requires measurement of the proportions in which productive factors can be and are actually used. Essentially the objective of such research would be an investigation of production functions.

Although the concept of the production function has been familiar for some time, its empirical investigation has, as is common, been neglected with important noteworthy exceptions. In this connection it should be noted that even though it is sometimes presented as an analysis of productive processes and its terminology is taken from the theory of production, input-output analysis, as it now stands, does not reveal

[26] Barriers to capital movement created by monopoly may create situations analogous to those described above resulting from labor-market imperfections.

the technologies actually in use in an economy. For this purpose a much higher degree of disaggregation would be necessary than is currently practiced or appears feasible. Interindustry flows may strongly reflect historical incidents by which certain technical processes are concentrated in a particular sector which subcontracts for other sectors. Or, if similar technical processes are widely used, the interindustry flows in a particular year may reflect different cyclical patterns in industry; one industry producing at its capacity may subcontract to another industry which has equipment capable of performing the necessary operations and is cyclically depressed.[27] Studies of capital coefficients made for input-output tables do indicate, however, a method which can be used for a factor proportions study.[28]

The objective of the process analysis approach newly developed at the RAND Corporation is exactly the empirical determination of production functions. The emphasis of the process analysis approach in establishing all the alternatives on a production-possibility schedule, which is essential for programming, is somewhat different from a factor proportions study. For the latter study not only the range of possibilities but the relative frequencies of their use and dynamic considerations involved in choice are important. The methods of process analysis can also be used for a factor proportions study, however.

For the study of factor proportions two general approaches seem to be available. The first, suggested by input-output studies of capital coefficients and which will be called the "product analysis" method, involves a census in each plant studied of the amounts of each type of factor of production used in the expansion of the output of a particular product. The second method, based on classifications of technical processes, requires the determination of the combinations of factors actually used by firms to perform certain standardized "tasks."

These approaches to the factor proportions study are not necessarily logically separate, nor should they always be completely different in application. The great advantage of process analysis in precise identification of outputs can compensate for the weakness of product analysis where multiproduct plants are involved. The advantage of product analysis in inclusion of all contributing inputs can be important when using the process analysis approach where it is difficult to isolate the contributions of all inputs. Thus, it is important in particular cases to have in mind a method combining both the product and process analyses.

[27] This point is made with force by H. Markowitz in *Process Analysis of the Metal Working Industries*, The RAND Corporation (Santa Monica, 1953), pp. 7-8.

[28] Esp. the studies made by the Inter-Industry Analysis Branch of the Office of Chief Economist, Bureau of Mines, U. S. Department of Interior.

The application of product analysis can be made in two ways: (1) By abstracting the data required from the engineering plans which are prepared when a new investment is undertaken and which list the construction, equipment, labor and materials required for the operation of the plant. Accounting records of new investment expenses could also supply part of the necessary information. (2) By means of "factor inventories" of existing plants to provide for these plants the information which the investment plan analysis provides for new expansions. No easy and automatic application of product analysis techniques is possible in the face of problems such as those raised by multiproduct firms and the measurement of the expansion of capacity. These problems can often be overcome, I believe, to make this a fruitful method.

Process analysis is based on the conception that all productive activity can be divided into separate technical processes with similar outputs whose inputs can be identified and compared. Process analysis thus provides another logically satisfactory approach to study of factor proportions. The process analysis approach can moreover provide the basis for a comparison of factor proportions by final products, and thus for an independent check of factor proportions computed by the product analysis method. This could be achieved by determining the appropriate physical processes and levels of activity necessary for the output of a particular final product and aggregating their factor inputs. The procedure just described is, in fact, that actually used in modern engineering practice in plant and equipment design and layout.

The disadvantage of the process analysis approach, however, stemming from the kinds of information which would be generally available, I believe, occurs precisely where the product analysis method is strong. The information for the process analysis approach must come from the records of inputs to particular processes and these records, because of the purposes for which they are kept, will seldom be sufficiently detailed and comprehensive as to the inputs involved in a process. As a result it will often be necessary in using the process analysis approach to estimate the contributions of "indirect" inputs to the processes studied.

A major source of information for the application of the process analysis approach may be the time cards kept by many firms. These cards list for each worker the time which he takes at each type of machine which he uses to perform the operations on the particular piece. These cards would have the labor inputs and machines specified for particular tasks and often contain other useful data as well. The job sheets which accompany production orders are also sources of information as they list the time per unit and in total required by each type of machine and process to finish a particular item.

IV. *Conclusions*

In this paper a number of different hypotheses have been developed and combined for the purpose of explaining outstanding features of some underdeveloped areas: the persistence of unemployment and underemployment, the coexistence of "modern" capital-intensive techniques and methods using a great deal of labor and little capital, and large differentials in factor returns in different sectors. I have suggested that to a considerable degree these conditions may be the result of a few characteristic conditions: factor-market imperfections, and limited technical substitutability of factors, with divergences between the proportions in which goods are demanded and in which they can be supplied with full use of available factors.

Factor-market imperfections which limit factor mobility create employment problems in underemployed areas with low per capita incomes and limited capital resources which are not different in kind but are much different in degree from those existing in the more advanced countries.

When the proportions in which factors can be combined are variable without limit, *i.e.,* with decreasing but always positive marginal returns to labor, additional labor can always produce additional output. If the technical substitutability of factors is limited, as is suggested here, the possibility of labor redundancy arises. Even if there are some sectors in which labor always has a positive marginal product there may be a divergence between maximum value output and full employment output if there is insufficient demand for the output of these sectors. These possibilities are again more important for the underdeveloped areas whose resource endowments are often not suited to the factor proportions dictated by the technological leadership of advanced countries. Differences in income distribution and the range of products may also make limited technical substitutability a more pressing problem in underdeveloped than in advanced areas.

COTTON MECHANIZATION AND ECONOMIC DEVELOPMENT

By JAMES H. STREET*

In formulating a general explanation of economic development, one of the central problems is to account satisfactorily for the disparate rates of growth which have taken place, not only between widely differing cultural regions, but within some of the industrially advanced parts of the world. This problem was recently stated succinctly by Theodore W. Schultz:

> In taking the long view, it is, of course, patent that economic development has occurred very unevenly, not only among countries and major parts of the world but also among communities within an economy or country. The very unevenness of this development presents two basic questions: What particular circumstances give rise to the process of economic development? Why does this process occur so unevenly, more especially, why does it by-pass entire communities within an economy, say within a country having well-established internal trade and migration?[1]

Schultz cites the American South, among other regions, as an example of a community which has been by-passed in this manner, and attributes the lag in economic development of the region primarily to its location relative to industrial-urban centers. The discussion which follows, while not denying a degree of significance to the factor which Schultz emphasizes, seeks to take a more comprehensive historical and theoretical approach to the problem. This paper summarizes the results of a study of the long retardation, followed by a recent sharp acceleration, in the application of mechanized methods of production in the cotton region of the southern United States. (It should be observed that this region does not coincide precisely with the South as a cultural region, though most of the welfare problems associated with cotton production have been concentrated in portions of the Old South. Moreover, while cotton is losing its relative importance as the dominating enterprise in the South, the conditions under which it is produced still exercise a major influence in the rural parts of the region.)

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[1] *The Economic Organization of Agriculture* (New York, 1953), p. 148.

An examination of one historical case hardly establishes the basis for a general explanation of regional economic retardation and acceleration; yet it is the writer's belief that the analytical categories applied in this instance, as well as certain of the conclusions, may be useful in considering other cases with similar characteristics. The analysis utilizes three groupings of forces: (1) institutional, (2) technological, and (3) exogenous factors in the process of development. Institutions, while they organize the activities of the community, are in general characterized by inertia and the tendency toward self-perpetuation. Technology, which includes improved theoretical conceptions and productive methods as well as mechanical devices, has a dynamic impact upon existing methods of production and is the chief source of conflict with existing institutional arrangements. Exogenous factors must be considered separately because a regional economy will at times be importantly affected by events originating independently outside the region.[2]

I. *The Cotton Region as an Underdeveloped Area*

The introduction of cotton-growing as a major farming enterprise and regional source of income during the postcolonial period of American development took place under conditions unusually receptive to rapid growth and technological improvement. Events in the raw-materials-producing New World during this period were closely linked to the Industrial Revolution abroad, and for a time partook of the same innovating spirit. While most American crops underwent an extended period of production under conditions of diversified, self-sufficient farming from which they emerged gradually to fill the increasing needs of an urban market, cotton came into its own as a commercial crop almost overnight. As a substitute for the declining tobacco, indigo, and rice enterprises, cotton found waiting for it an established plantation economy with overseas trade connections ready to exploit a new com-

[2] This article is based on a larger study scheduled for publication in 1956 under the title *The New Revolution in the Cotton Economy.* The present study relies for its basic conceptions primarily upon two sources: the respective analyses of economic development of C. E. Ayres and Simon S. Kuznets. Ayres' penetrating description of the institutional and technological aspects of economic change has been brilliantly set forth in *The Theory of Economic Progress* (Chapel Hill, 1944). Ayres' theoretical framework seems to have been unduly neglected thus far by writers on the theory of economic development. Kuznets' contribution to the factorial method of historical analysis is perhaps more widely known; but his perceptive classroom treatment of the general process of economic development has not appeared in print. The method is exemplified in an early essay on "Retardation of Industrial Growth," recently reprinted in *Economic Change: Selected Essays in Business Cycles, National Income, and Economic Growth* (New York, 1953). The writer must of course accept the responsibility for whatever deficiencies result from the attempt to fuse analytical methods derived from two such vigorously independent minds.

which could not be held in check by such devices as the exclusive crown grant likewise permitted an infiltration of yeoman farmers who gave the region a somewhat mixed institutional complexion. Even so, the interests of the dominant groups within and without the South were for a long period not oriented toward a balanced economic development of the region, but toward a perpetuation of the policies identified with colonialism. Commercially, the Cotton South was a colony of the Manchester mills long after the Revolutionary War.

As the economy of the United States became more closely integrated, especially after the Civil War, the South merely tended to shift its complementary relationship of specialization and exchange to a new locus of attachment. Such rail and other transport facilities as were constructed facilitated the maintenance of distinctly industrial and agricultural sections of the country. Though this arrangement was actively promoted by Northern financial and industrial interests and was at times heatedly protested in the South, it was reinforced at almost every point by southern commercial institutions and long-standing habits of thought.

As is well known, the overspecialization represented by the one-cash-crop system (which was not confined to cotton in all parts of the South), led to wasteful depletion of the soil. Because land was cheap and the principal investment was in chattel slaves, the practice arose of "killing the land" of its virgin fertility and moving westward—a practice which was continued long after slavery was abolished. Thus were created cost differentials between the older and the newer parts of the region which have never been overcome.

In light of the increasing diversity of farm enterprises in the South, one wonders at the long insistence that only cotton (or, in certain localities, only tobacco, rice, or sugar cane) could be successfully produced. While it is true that recent changes, such as the growth of urban population, changing dietary habits, improved transport, and other factors have fostered increasing variety in farm enterprises, the fact is that amazingly little attention was given to alternative possibilities until very lately. One is tempted to draw an analogy between the tendency toward economic overspecialization and the principle of evolutionary overspecialization in biology.

2. *The organization of appropriate institutions of control.* These consisted principally of the plantation system; slavery and its successor, the sharecrop system; and the local credit system, with its reliance upon the crop lien and the landlord's "furnish," or advance to the tenant on the prospective crop. All of these are too familiar to require description here, but it is important to note their combined effect on the pattern of income distribution, the maintenance of a stable and abun-

dant labor supply under absolute control, and the mutual reinforcement of the institutional pattern.

The plantation system entailed certain efficiencies which have been well described by Lewis Cecil Gray.[4] These were not, however, primarily economies of scale such as are associated with technologically determined large-scale industry or modern large-scale farming. There are plantations in the South today (though they are rapidly disappearing) that are operated as clusters of small-scale units under virtually independent management as far as the process of production is concerned. The chief advantage of the plantation system stemmed from the powerful means of institutional control over labor, and hence over the distribution of income, which it afforded.

The sharecrop system which emerged to replace slavery after the Civil War was a change in form but not in substance, since its chief purpose was to insure the stability of the labor supply. The local credit system tended to insure the preservation of the one-crop system because credit was hardly available for any other purpose, and by imposing systematic indebtedness on the tenant groups it helped to maintain the existence of a servile, illiterate laboring class regarded as essential to the production of the cotton crop.

This had several unfortunate "boomerang" effects on the South. It meant that during depressed periods in the cotton markets (as in the 1840's, the 1890's, and the 1930's), when it might have seemed desirable to shift to some other form of production, the lack of versatility of the labor force and the rigidity of the credit system impeded such shifts. It meant that immigration into the region by European groups such as those who settled in the Middle West was discouraged, since the new arrivals did not want to compete with slaves and sharecroppers. In the few instances when such migrations took place, as in the case of the German and Bohemian settlements in central Texas and in Alabama, these communities remained culturally isolated islands seemingly unable to influence the general pattern of agriculture even though they successfully practiced general farming of the yeoman type. Finally, it meant that there was little attraction to industry to enter a region where the general income level was so low and the regional economy so dependent on the fortunes of a single enterprise.

3. *Demographic characteristics of a predominantly rural culture which has begun to be affected by technologically more advanced areas.* A commonly noted characteristic of pre-industrial communities is the tendency for the net survival rate to rise as the death rate declines under the influence of modern sanitation and medicine while the birth

[4] *History of Agriculture in the Southern United States to 1860,* 2 vols. (Washington, 1933), Vol. I, pp. 301-03, 478-79.

rate, primarily subject to older habit patterns, falls more slowly. This interesting interplay of technological and institutional forces is reflected in the South, whose rural birth and death rates (particularly among Negroes) have been among the highest in the country. Rupert B. Vance has estimated that during the period 1920-1941 the rate of natural increase in the eleven southeastern states was so great that it would have required an annual net outflow of over 250,000 migrants merely to maintain a stable population.[5] Any reduction in the outflow, such as occurred during the depression years, tended to intensify the problem of providing employment for the increasing population in a predominantly rural region. The result has been a chronic tendency for the South to oversupply itself with farm labor, leading to unemployment and substantial, though less apparent, underemployment.

4. *A failure to make vigorous use of available technological alternatives to customary production methods.* This generalization is more difficult to substantiate than the three preceding, since it is impossible to devise a norm for maximum utilization of available technology, and since there are unquestionably many factors other than mere reluctance to use the inventions that have been made which influence the rate of technological innovation. In the case of cotton production a complex series of technical obstacles had to be overcome before complete mechanization could be regarded as practicable. Cotton as a plant lacks the uniformity and cultural simplicity of the cereal crops and hence must be handled with more complicated equipment. In addition, the sort of technological borrowing which took place in the long stream of inventions from McCormick's reaper to the modern self-propelled grain combine was for the most part not available to the inventors of the cotton picker. Furthermore, the pattern of a resident labor force which had been established in the South made it unsatisfactory to mechanize the harvest without simultaneously providing a solution to the weed problem.

Notwithstanding these considerations, however, it is also fairly clear that the rate of innovation can to some degree be forced by active research and by the vigorous sponsorship of the more enterprising producers in an industry. The development of a successful cotton harvester was hardly delayed for lack of ingenuity and painstaking investigation on the part of aspiring inventors. Most of them received scant support. The principle of the cotton stripper, now widely used in the High Plains of Texas, was known in 1874, but did not arouse serious interest until the critical crop year of 1926, and thereafter only intermittently until the reduction in migratory labor during the second

[5] *All These People* (Chapel Hill, 1945), p. 131.

world war made a technological solution imperative. Roughly prepared cotton, which had previously been unacceptable at the gins and which had entailed an intolerable amount of waste when hand labor was plentiful, now was perforce accepted by farmers, ginners, and spinners alike, even though the latter two groups had to devise special methods to handle it.

The history of the development of the spindle picker, now used extensively in California and increasingly in other irrigated or rain-belt cotton, reveals similar aspects. Angus Campbell, whose pioneer work in the early part of the century established the basis for the machine ultimately put on the market by the International Harvester Company in 1948, spent 37 years working on his invention until his death in 1922. Each harvest season for over twenty years he used his annual vacation time to travel from Chicago, where he was employed by the Deering Harvester Company, to one of the cotton states to try out his latest model. Thus he could engage in only a few brief field trials each year, without access to adequate nearby shop facilities for modifications on the spot. Apparently there was little interest in his efforts, although the principles he worked out later proved to be of fundamental importance. L. C. Stuckenborg, John F. Appleby (the inventor of the twine binder), and Hiram N. Berry also spent long periods working on machines of considerable ingenuity, but with limited backing. John D. Rust, who in association with his brother Mack is generally credited with having devised the first successful spindle picker, conceived his machine in 1927 and had a working model in 1931, but did not see it in commercial production until 1949.

Each inventor was forced in time to realize that there was little prospect for the adoption of a mechanical harvester that would do only a passably good job. It was necessary for the machine to be ***highly*** efficient in the quality of the product it turned out and *overwhelmingly* labor-saving in comparison with hand picking. It must be acknowledged that when the Rust brothers were finally able to develop such a machine, the delay in its commercial introduction was to some degree deliberate on their part. Wishing to avoid the indiscriminate displacement of farm labor that might result from marketing their machine in the conventional way, the Rusts sought for years to safeguard its introduction by devices that would spread its labor-saving benefits among small farmers and tenants, and thus they lost the lead in getting the spindle picker onto the market. (Machines embodying Rust patents are presently being manufactured by two companies under nonexclusive licenses.)

The process of innovation is a complex one fraught with fortuitous

TABLE I.—NUMBER AND PERCENTAGE CHANGE OF FARM TRACTORS, UNITED STATES AND TEN COTTON STATES, 1920–1950

	Number of Tractors on Farms[a]						Percentage of Increase over Previous Date				
	1920 Jan. 1	1925 Jan. 1	1930 Apr. 1	1940 Apr. 1	1945 Jan. 1	1950 Apr. 1	1920–1925	1925–1930	1930–1940	1940–1945	1945–1950
United States	246.0	505.9	920.0	1,567.4	2,421.5	3,609.3	106	82	70	55	49
Nonsouth	209.6	426.1	774.2	1,295.9	1,923.4	2,687.0	103	82	67	48	40
North Carolina	2.3	7.9	11.4	12.8	31.2	73.5	247	45	12	145	136
South Carolina	1.3	2.9	3.5	4.8	12.4	30.3	123	19	38	160	144
Georgia	2.3	4.1	5.9	9.3	24.6	60.3	84	42	59	164	145
Tennessee	1.9	4.8	6.9	11.8	24.1	59.8	155	44	72	104	148
Alabama	.8	2.5	4.7	7.6	17.1	45.8	204	89	64	123	168
Mississippi	.7	1.9	5.5	10.6	21.1	51.7	181	196	91	99	145
Arkansas	1.8	3.5	5.7	12.6	26.5	60.3	91	64	121	111	128
Louisiana	2.8	3.5	5.0	9.5	17.6	35.7	24	44	89	86	103
Oklahoma	6.2	11.0	26.0	45.4	70.4	93.7	76	137	75	55	33
Texas	9.0	16.8	37.3	98.9	162.4	232.3	86	123	165	64	43
Ten Cotton States	29.1	58.8	111.9	223.3	407.4	743.4	102	90	100	82	83
Percentage in Cotton States	11.8	11.6	12.2	14.2	16.8	20.6					

[a] In thousands. No census of tractor numbers was taken in 1935.

Source: U. S. Bureau of the Census, *U. S. Census of Agriculture: 1950.* Vol. II, *General Report, Statistics by Subjects* (Washington, 1952), Table 15.

elements. It is the writer's belief, however, that for at least the period since the advent of the tractor the stultifying effect of southern social and economic institutions has been a greater factor than the existence of technical difficulties in explaining the slow rate of progress in the mechanization of cotton production and the lag in the general rationalization of southern agriculture as well. The overriding circumstance in this process has been the availability of a routinized, poorly educated, and politically ineffective rural labor force which for a long period rendered sustained inventive and developmental interest in labor-saving farm machines economically pointless. Until the existing population distribution and the institutional structure embracing it were seriously jarred by the impact of outside events, there was an irresistible predisposition to try to solve the problems of the cotton economy by institutional expedients rather than by technological reorganization.

II. *The Process of Accelerated Change*

The past decade has witnessed a striking increase in the adoption of mechanized methods of production in southern agriculture. In considering cotton production, a distinction must be drawn between partial mechanization, which signifies the introduction of the tractor without a notable reduction in total labor requirements, and complete mechanization, which entails sufficient additional equipment to reduce greatly the man-hours required in the twin bottlenecks, cultivation and harvesting. Complete mechanization will not necessarily follow closely on the heels of partial mechanization, but the latter is often a transitional stage toward the former.

It is therefore highly significant that the number of farm tractors in the ten leading cotton states (excluding California, Arizona, New Mexico and Missouri) rose from 223,300 in 1940 to 743,400 in 1950, an increase of 233 per cent, as compared with a national increase of 130 per cent and an increase in the Nonsouth of 107 per cent. The highest rates of increase were in the southeastern states, where there were relatively few tractors in use prior to the second world war (see Table I). The southwestern states had already experienced substantial rates of increase in tractor numbers during the prewar decade, but continued to add tractors at rates higher than the Nonsouth during the succeeding decade. As a result of these increases, the ten specified cotton states had 20.6 per cent of the tractors in the United States in 1950, as compared with 14.2 per cent in 1940.

Statistics on the newer types of machines are less readily available, but it is estimated that there were about 18,500 mechanical cotton

strippers and 15,500 spindle pickers available for use by 1953.[6] The former had not begun to appear in commercial quantities until 1944, and the latter until 1948. The pattern of introduction of these machines is suggested by Table II, which is based on ginners' reports. It shows that California cotton raisers have led the field in degree of mechaniza-

TABLE II.—PERCENTAGE OF COTTON CROP MECHANICALLY HARVESTED, UNITED STATES AND BY COTTON STATES, 1945–1953[a]

Area	1945	1946	1947	1948	1949	1950	1951	1952	1953
United States	1	[b]	2	3	6	8	15	18	22
Southeast	[b]	[b]	[b]	1	[b]	[b]	2	2	5
Alabama					[b]	[b]	[b]	1	3
Florida					0	0	1	4	12
Georgia					[b]	[b]	2	3	6
North Carolina					[b]	[b]	1	1	3
South Carolina					1	[b]	3	1	7
Virginia					0	0	0	0	0
Mid-South	1	[b]	[b]	2	2	2	4	6	13
Arkansas					1	1	2	2	9
Louisiana					[b]	3	11	13	34
Mississippi					4	3	3	7	13
Missouri					2	[b]	1	6	13
Tennessee					[b]	[b]	[b]	1	1
Southwest	3	2	6	6	10	12	18	22	24
Oklahoma					2	6	13	17	19
Texas					11	12	19	22	24
Far West	[b]	1	[b]	6	9	23	41	50	53
Arizona					4	9	26	46	54
California					13	34	53	59	59
New Mexico					3	1	7	12	15

[a] Includes machine picking and machine stripping. Data by states not available before 1949.

[b] Less than 0.5 per cent.

Source: Charges for Ginning Cotton, Costs of Selected Services Incident to Marketing, and Related Information, annual reports for indicated years issued by Agricultural Marketing Service (formerly, Production and Marketing Administration), U. S. Department of Agriculture, Washington.

tion. They harvested 59 per cent of their crop mechanically in 1952 and 1953. Arizona ranked second with 54 per cent in 1953. Texas ranked fourth in percentages (24 per cent), but this represented nearly as much cotton as was mechanically harvested in California. Much of the Texas cotton was harvested with strippers, while the California and Arizona cotton was harvested principally with spindle pickers. The

[6] Estimates prepared by the National Cotton Council of America, Memphis, Tennessee, on the basis of production data provided by manufacturers, and allowing for obsolescence on earlier models.

spindle picker is also coming into significant commercial use in the alluvial areas of Mississippi, Arkansas, Louisiana, and the boot-heel of Missouri, where large fields of high-yielding cotton predominate.[7]

The factors which seem to have been most directly responsible for the recent acceleration in cotton mechanization are (1) the "shaking up" effect of the second world war on the cotton economy, (2) the simultaneous fruition of inventive effort, and (3) the receptive institutional climate in the newer cotton areas.

1. *The effects of the second world war on the cotton economy.* The second world war, which must be treated as an exogenous influence on the cotton region, created highly disturbing effects which for a time severely intensified the uncertainty of producers' decisions. At the same time, however, it brought certain benefits which may be attributed to the general "shaking up" received by the enterprise.

The initial effect of the outbreak of hostilities in Europe in the fall of 1939 was unfavorable to cotton. Exports fell off sharply, and although domestic consumption rose to unprecedented heights after the United States entered the war, surpluses began to pile up in nearly all cotton-producing countries to the extent that, at the beginning of the 1945 crop season, the world carry-over reached 26½ million bales. This carry-over, an all-time record, was equivalent to one year's normal world growth and consumption. Of the total, 45 per cent was American cotton.

Cotton acreage in cultivation declined almost continuously from year to year during the war, yet yields proved exceptionally high, and average annual production in the United States for the 1940-1944 period was about what it had been in 1938 and 1939. A considerable number of southern farmers were induced to make radical enterprise adjustments during these years, such as entering feed and livestock production, and many of these shifts were preserved during the postwar period.

The war also had severe effects on farm population. The combined result of military inductions, migration to other regions, and movement from farm to nonfarm areas was the sharpest reduction in farm population ever witnessed in this country within a similar period. The South was the region with the heaviest losses, experiencing a 20 per cent decline in farm population from 1940 to 1945. Nearly half of the decline took place within one year (1942).[8] Although there are grounds

[7] As will be noted below, a considerable variety of additional equiqment is needed to achieve complete mechanization, but reliable figures on the manufacture and distribution of this equipment are not readily available.

[8] U. S. Agricultural Marketing Service, *Farm Population: Annual Estimates by States, Major Geographic Divisions, and Regions, 1920-1950 and the United States, 1910-1950* (Washington, 1953), pp. 12-14.

to question whether this population outflow was sufficient to create a condition of actual labor unavailability on cotton farms in the South after the postwar readjustments had taken place, the large and rapid shifts of population during the war years undoubtedly had an unsettling effect on producers who had traditionally depended on an abundant supply of low-cost resident labor.[9]

The pessimistic outlook for cotton at the end of the war was further aggravated by the knowledge that synthetic fibers had made heavy inroads on long-standing markets for cotton (particularly in the automobile tire industry), and by the widespread belief that there would be a business recession in the United States following the war. These and related considerations led the Pace Committee to conduct an intensive investigation into the postwar problems to be faced by the cotton enterprise and to sponsor a broad research program later reflected in the Research and Marketing Act of 1946.[10]

Paradoxically, in the face of these discouragements, some of the more favorably situated cotton farmers found it possible to undertake partial mechanization for the first time during the war years. For this an increasingly favorable price-cost relationship was chiefly responsible. Although southern farm incomes remained low in comparison with those in other regions and pursuits, they rose greatly relative to what they had been. And notwithstanding the fact that tractors rarely relieved the most pressing labor stringencies on the farm, there was a strong impetus to begin to catch up with the more "progressive" farmers who owned tractors. The war thus caused many operators who had previously not seriously entertained the idea of converting their farms to become machinery-minded.

Postwar developments contributed to this possibility. The record carry-over of 1945 was worked off in a surprisingly short time, as a result of short crops in 1945 and 1946 and an unexpectedly high demand for cotton both at home and abroad. The latter resulted from the sustained high level of consumer incomes and the government's various foreign-assistance programs. The Korean outbreak prolonged the period of unusual consumption rates for cotton and the price rose so rapidly as to lead to the imposition of a ceiling on the price of raw cotton for the first time. These factors created an unusually favorable climate for the sale of farm machinery in the Cotton Belt.

2. *The simultaneous fruition of inventive effort.* It has often been

[9] See the writer's "The 'Labor Vacuum' and Cotton Mechanization," *Jour. Farm Econ.*, Aug. 1953, XXXV, 381-97.

[10] U. S. House Committee on Agriculture, *Study of Agricultural and Economic Problems of the Cotton Belt*, Hearings before the Special Subcommittee on Cotton, 80th Cong., 1st Sess., 2 parts (Washington, 1947).

pointed out that the development of a satisfactory cotton harvester would not in itself be likely to lead operators in the humid parts of the cotton region to mechanize, in view of the important secondary bottleneck of weed control. So long as it was necessary to maintain a resident labor force for weeding and thinning, it was argued, the same labor could be used for hand picking. To displace it by machines only in the peak season would be both uneconomic and hazardous to the crop if the labor should leave for fuller employment elsewhere.

The past few years, however, have seen a great variety of distinct approaches to weed control culminate in a concerted and largely successful attack on the problem. By various combinations of available methods—which include planting to a stand, cross cultivation, use of the rotary hoe, sweep cultivation, flame weeding, and application of pre- and post-emergence chemical herbicides—it is now possible, or shortly will be possible (depending on the area), to reduce cultivation to a mechanical process.

The cumulative character of technological development is further illustrated by the fact that new varieties of cotton are now being bred to facilitate the use of mechanical harvesters; chemical defoliants are used to remove the plant leaves before picking; a topping machine is used to reduce the size of rank cotton on irrigated land; gins have been redesigned to dry and clean mechanically harvested cotton; and spinners are adapting their methods to utilize the modified product. Nearly every one of these achievements represented a formidable obstacle a few years ago, but problem after problem has responded to research once a strong conviction became established that mechanization was on its way.

The labor-saving aspect of total mechanization, where it has been put into effect, is substantial. In the Mississippi Delta under the traditional system of mule power and half-row equipment, with all weeding, thinning and picking done by hand, approximately 155 man-hours of labor have been required to produce a bale of cotton. By mechanizing as completely as possible with equipment available in 1950 (tractor land-preparation, rotary hoe, flame weeder, and spindle picker) this could be cut to 30 man-hours, which allows for some hand labor to remove weeds in wet seasons. When an assured method of weed control is developed, it is expected that the labor requirement to produce a bale of cotton in this locality can be reduced to ten or twelve man-hours.[11]

3. *The receptive institutional climate in the newer cotton areas.* In surveying the Cotton Belt, one cannot fail to observe that the most

[11] Grady B. Crowe, "Farm Mechanization Research in the South," *Agric. Econ. Research*, Jan. 1951, III, 6.

rapid rates of introduction of full mechanization are occurring in the newer areas of the Far West and Southwest. These are in general more productive areas than most of the older cotton region, and they are less subject to the weed problem. However, more significance probably attaches to the fact that, as younger areas, they have escaped the encrustation of institutions which has inhibited change elsewhere. Since sharecropping never became established here, there have not been the problems of excessive resident population, small farm units, and depleted soil associated with this system in the Old South. When the usual numbers of migratory workers failed to appear in the High Plains during the war years, farmers almost immediately set about devising mechanical alternatives in the local blacksmith and welding shops. It is significant that the smaller farmers, who were least able to attract migrant workers, were prominent in this movement.

There are other, less tangible, indications that southwestern farmers have not been as tradition-bound in their attitude toward newer methods of farming. Part of the explanation no doubt lies in the circumstance that, having more resources, farm operators in the western parts of the belt had larger cash incomes and therefore greater flexibility in trying new methods. But the fact remains that in the older cotton areas even the larger, well-financed operators on good land did not as a group show the same aggressiveness in promoting mechanization that was already evident in the West before the war, and only recently have their attitudes been changing.[12]

Some highly significant transitional changes in tenure arrangements have been taking place in the Southeast and Mid-South as plantation operators have entered the era of partial mechanization. Most of the larger farms were formerly operated with sharecroppers, but increasingly some combination of share and wage hire is used. Under one type of transitional arrangement, each cropper family is given a small sharecrop, insufficient to provide adequate income for the year, but intended to induce the family to remain located on the farm and to see the crop through. For the remainder of its income the family is dependent on work for day wages. This arrangement has the advantage for the employer that it provides relative stability of the labor supply while not obligating him to provide continuous employment for the entire force. Thus it lends flexibility to his operations as mechanization is introduced by degrees.

Another device is based on the old practice on some plantations of

[12] A few operators have been notable exceptions. Their willingness to experiment and to incur losses with the early machines was important in the ultimate adaptation of these techniques to local conditions.

working the land "through and through," or under a gang system directed by an overseer. Each family is assigned a definite crop acreage, but instead of tending individual plots, all hands work the plantation land in common. This facilitates the use of tractors for ground breaking and seedbed preparation, followed in some instances by mechanical planting and cultivation. Since the planter thus increases his share of the production inputs, he may charge his croppers service fees for the operations performed with power equipment, or change the share ratio from the traditional 50-50 to a 60-40 basis. A few of the tenants are provided with preferred employment as tractor drivers or mechanics at day rates considerably higher than those prevailing for ordinary labor.

A third variation divides the plantation force into two parts: (1) a basic crew sufficient to insure weed control, stabilized on the farm by being assured a sharecrop; and (2) the remainder of the employees, who are on a wage status and whose employment fluctuates with the demands of the season and the year. The members of the latter group have little job security and are most readily detached as mechanization reduces the need for hand labor or as alternative opportunities pull them away from the farm.

These transitional arrangements reflect the reluctance of a number of farm operators to commit themselves wholly to a wage system and a permanently reduced labor force until they "see where mechanization is going." In some cases they have been compelled to alter traditional arrangements by the departure of farm workers for other employment; in other cases the changes are cautious voluntary ventures into the uncertainties of a radically different way of farming. Here and there an operator makes the final plunge into complete mechanization and replans his operations throughout. Vacant tenant houses are pulled down, farm lay-outs are consolidated, the training of a technically competent labor force is undertaken, and every operation from residue disposal of the old crop to the harvesting and processing of the new crop is planned with mechanized handling in mind. This is indeed a great change, and once made it is virtually irreversible.

It is doubtful whether such methods as these can be effectively used on the very small farms still to be found in many parts of the South, though it does not follow that only the large factory farm can become efficient. It is clear in any case that complete mechanization requires a considerably higher degree of technical and managerial skill than has characterized cotton production in the past. This will undoubtedly intensify the competitive strains within the enterprise between low- and high-cost producers, and will thus pose some difficult questions for public

policy. But at the same time it should significantly increase the productivity of farm labor, with all that that signifies for increased standards of income and welfare within the region.

III. *Conclusions for Theory*

The process of mechanization now under way has many implications for the cotton enterprise which cannot be elaborated here. Nor has it been possible to take adequate note of the many other changes simultaneously taking place in the regional economy of the South, one of the most significant of which is the growth of nonagricultural industry with its increased alternative economic opportunities for farm labor. Limited as the investigation is, however, it serves to illustrate that, after due allowance for exogenous influences has been made, the same forces which affect rates of growth in larger economies may explain differences within and among regional enterprises.

The first of these forces is the power of institutions to inhibit progressive change even though they may afford a liberalizing environment at the onset of a period of innovation. While the tendency of institutions to rigidify into a complex structure of mutually reinforcing controls has been documented in countless instances, it is surprising how often this aspect of economic development is overlooked or lightly dismissed in theoretical discussions of factors making for differential rates of change. Now that induced economic development is the order of the day, a study of the circumstances under which institutions become permissive of change must be accorded a place in the strategy of planning. Lately it has become the special province of anthropologists to advise economists, administrators, and technicians in this area, as it was once their role to call attention to the problem.[13]

The second, and in general initiating, force is the compelling quality of technological innovation which, though it may be long delayed by technical circumstances or inhibiting institutions, inevitably forces adjustments in such institutions. This is especially likely to happen when simultaneous inventions and improvements from a variety of sources come together in such a way as to supplement each other with explosive force.[14] The case of cotton production also emphasizes the importance of the opportunity (or absence of opportunity) for technological borrowing in speeding up the process of invention. This is but an aspect of the general principle of technological continuity.

[13] *Cf. Cultural Patterns and Technical Change,* edited by Margaret Mead (Paris, UNESCO, 1953).

[14] The Industrial Revolution in England is the outstanding example of such a combination of previously unrelated elements. Ayres has shown the significance of the same process as it occurred in printing and shipbuilding, *op. cit.,* Ch. 7.

The third force, particularly applicable to preindustrial communities, is what may be called the unassimilated population factor. A high rate of population growth, which is itself a result of previous technological influences in combination with a lag in institutional adjustments, may inhibit further economic improvement. Kuznets has commented on the difficulty of inducing industrialization in areas with a very high population density such as the Far East, where the sheer mass of humanity limits the expansion of transportation and related facilities. American experience has shown that even much more moderate differentials in population density and growth may have significant regional effects. The strategy of planned development requires attention to population relocation both in respect to the effects on the migrants and to the effects on retarded enterprises. Our experience with rural resettlement and land-use planning in the 'thirties illustrates the complexity of these problems.

It must be emphasized in conclusion that it has not been the purpose of this paper to draw a close historical parallel between conditions in the American cotton belt and those in regions of differing cultural and geographic characteristics. Rather the aim has been to utilize the wealth of statistical and other descriptive data which are now available with regard to one area to arrive at the most general considerations which may have application to other areas. In each region the special circumstances and events will no doubt be different, while the contending forces are essentially the same.

SPATIAL EQUILIBRIUM MODELS OF THE LIVESTOCK-FEED ECONOMY

By Karl A. Fox and Richard C. Taeuber*

During the past three or four years several articles have appeared on the theory of spatial equilibrium.[1] So far, however, only one empirical application seems to have been published.[2]

The closely related "transportation model" has won a prominent place in the linear programming literature and has been applied successfully to the shipping problems of some industrial concerns. In this model, specified quantities of a commodity are to be shipped from each of a number of sources and other specified quantities are to be received at each of a number of destinations, total receipts being equal to total shipments. The receipts at each market are determined in advance and do not depend upon price. The objective is to satisfy the set of destination requirements at the least possible total transportation cost. The "contract award model" is quite similar except that total supplies at shipping points exceed total destination requirements, and the problem is to allocate purchases in such a way as to fill destination requirements at the lowest possible total delivered cost (f.o.b. cost plus freight). This model has been applied successfully to some purchasing programs of the federal government; and similar problems must arise in the procurement operations of private concerns.

The "spatial equilibrium model" differs from these in that prices at each shipping point and destination are continuous functions of the quantities shipped or received plus the quantities produced and retained locally. The spatial equilibrium model, with its price-dependent demand and supply functions, may be quite useful in analyzing problems of public policy, most of which arise at the industry level. These include

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[1] See, for example, W. J. Baumol, "Spatial Equilibrium with Supply Points Separated from Markets and with Supplies Predetermined," Report under contract with the U. S. Department of Agriculture, Bureau of Agricultural Economics, Feb. 1952 (hectographed); M. Beckmann, "A Continuous Model of Transportation," *Econometrica*, Oct. 1952, XX, 643-60; S. Enke, "Equilibrium among Spatially Separated Markets: Solution by Electric Analogue," *Econometrica*, Jan. 1951, XIX, 40-47; P. A. Samuelson, "Spatial Price Equilibrium and Linear Programming," *Am. Econ. Rev.*, June 1952, XLII, 283-303.

[2] K. A. Fox, "A Spatial Equilibrium Model of the Livestock-Feed Economy in the United States" *Econometrica*, Oct. 1953, XXI, 547-566.

tariff and other policies affecting international trade, excise taxes, freight-rate regulation, farm price-support policies, and perhaps others. The competitive organization and continuously varying prices in many agricultural commodity markets make these particularly adaptable to analysis by means of the spatial equilibrium model. The existence of a considerable body of empirical demand analyses for farm products is also a favorable factor.

The present paper attempts three things: (1) It expands the empirical model previously mentioned into a more complex one involving two related commodities and applies it to the analysis of changes in freight rates and in various "outside" factors; (2) it appraises the results obtained from this model in relation to those provided by simpler approaches; and (3) it presents some general conclusions as to the applicability of spatial equilibrium models to other commodities and to other types of market structures.

The spatial equilibrium problem for a single commodity has been stated by Enke as follows:

> There are three [or more] regions trading a homogeneous good. Each region constitutes a single and distinct market. The regions of each possible pair of regions are separated—but not isolated—by a transportation cost per physical unit which is independent of volume. There are no legal restrictions to limit the actions of profit-seeking traders in each region. For each region the functions which relate local production and local use to local price are known, and consequently the magnitude of the difference which will be exported or imported at each local price is also known. Given these trade functions and transportation costs, we wish to ascertain: (1) the net price in each region, (2) the quantity of exports or imports for each region, (3) which regions export, import, or do neither, (4) the aggregate trade in the commodity, (5) the volume and direction of trade between each possible pair of regions.[3]

Enke showed that this problem could be solved by "a relatively simple electric circuit."[4] Samuelson treated the same problem on a strictly mathematical basis, and stated that it could be solved "by trial and error or by a systematic procedure of varying shipments" in the direction that ultimately maximizes a certain function. Baumol independently arrived at results similar to Samuelson's. Beckmann formulated the spatial equilibrium problem in terms of continuous distributions of production density and transportation costs.

The first section of this paper extends the Samuelson or Baumol type of approach to an empirical model of the livestock-feed economy in

[3] *Op. cit.*, p. 41.

[4] However, a 10-region model for a single commodity would require 90 rectifiers and numerous batteries and resistors.

the United States. Livestock and feed products account for 60 per cent of total cash receipts from farm marketings, and livestock products account for about an equal percentage of retail expenditures for food. The importance and complexity of the livestock-feed economy are such as to justify the development of rather sophisticated models to appraise government policies and to keep current economic developments under review, as in the outlook and situation reports of the federal Department of Agriculture.

In the earlier article by Fox, the United States was divided into ten regions whose boundaries were defined in rough accordance with differences in the types of livestock and feed production which were given emphasis in them.[5] Each region was a group of states, as the basic data were published by states. The model included a demand function for feed in each of the ten regions and a structure of freight rates or transportation costs between all possible pairs of regions. Livestock numbers and prices in each region were taken as given or predetermined quantities, as was feed production. The analysis was limited to solving for the price and consumption of feed in each region and for the pattern and volume of interregional shipments of feed.

In contrast, the present model treats livestock prices and production in each region as mutually dependent variables. It includes demand and supply functions for livestock products in each region and a set of interregional freight rates for livestock products. The complete solution for any set of values of given variables (including feed production) must yield (1) prices, production and consumption of livestock products in each region and the pattern of interregional shipments of livestock products, and (2) prices and consumption of feed in each region and the pattern of interregional shipments of feed.

I. *Data and Assumptions of the Expanded Model*

The differences between the earlier model and the one presented below can be summarized in the following sets of equations:

A. Previous Model

Demand for feed:

$$p_c = f\ (q_c,\ z_h^*,\ p_h^*) \tag{1.1}$$

Supply of feed:

$$z_c^* = k \tag{1.2}$$

[5] The regional breakdown was adapted from a standard grouping developed in the former Bureau of Agricultural Economics, based on the dominant types of livestock farming carried on in different parts of the country. The adaptation consisted in combining certain of the BAE regions, reducing the total number from twelve to ten. Use of regions rather than states greatly reduced the computational burden; further, as each region was a group of similar states, most of the relevant differences among states were reflected in the differences among BAE regions.

"Gross" equilibrium condition for feed:

(1.3) $$\sum_{1}^{10} q_c = \sum_{1}^{10} z_c^*$$

B. Present (Joint) Model

Demand for feed:

(2.1) $$p_c = f\ (q_c,\ z_h,\ p_h)$$

Supply of feed:

(2.2) $$z_c^* = k$$

Demand for livestock:

(2.3) $$p_h = f\ (q_h,\ n^*,\ y^*)$$

Supply of livestock:

(2.4) $$z_h = f\ (p_h,\ p_c)$$

"Gross" equilibrium condition for feed:

(2.5) $$\sum_{1}^{10} q_c = \sum_{1}^{10} z_c^*$$

"Gross" equilibrium condition for livestock:

(2.6) $$\sum_{1}^{10} q_h = \sum_{1}^{10} z_h$$

In these equations, the variables have the following significance: p_c = price of feed; q_c = consumption of feed; z_h = production of livestock in terms of grain-consuming animal units; p_h = price of livestock; z_c = production of feed; q_h = consumption of livestock; n = human population; and y = disposable personal income per capita.

Variables marked with an asterisk in any equation are "predetermined"—that is, they are assumed to be given numbers. The "gross" equilibrium conditions simply specify that total consumption must equal total production for the United States as a whole. In addition to these, each of the two models includes the more intricate and detailed equilibrium conditions which determine the pattern of interregional trade and regional price differentials. Except for the "gross" equilibrium conditions, the models include an equation of each type (demand and supply for feed and for livestock) for each of the 10 regions. Thus, if the supply "functions" for feed are counted, the present model includes 40 equations in addition to various equilibrium requirements.

Despite the greater complexity of the new joint model, in practice it was not difficult to manipulate it and obtain solutions using ordinary desk calculators. Once an initial joint equilibrium pattern was determined under approximate 1949-50 conditions, it was found possible to obtain equilibrium solutions for other sets of initial conditions (such as a severe drought) within two or three hours—sometimes less if the initial source-and-destination pairings for feed were not disturbed.

Freight rates and basic data. It has been noted above that three variables in the joint model, namely feed production, human population, and disposable income per capita, are taken as given numbers. The values of these variables for each region, at levels appropriate for the 1949-50 feeding year, are shown in Table I. In addition, column 2 of this table contains the numbers of grain-consuming animal units in each region during 1949-50. This variable was used along with the other three in establishing the level and arithmetic slopes of the demand curves for livestock products and feed in each region.[6]

The structure of freight rates for feed is shown in Table II. These freight rates were estimated on the basis of data on freight charges by mileage blocks from the 1950 ICC waybill sample.[7] They are not

[6] Regional data on production of *feed* (actually feed grains and other concentrated feeds) are based on R. D. Jennings, *Feed Consumed by Livestock, 1949-50;* U.S.D.A. Stat. Bull. No. 145, June 1954.

Livestock production in the model is stated in terms of grain-consuming animal units. This series is constructed by weighting numbers of each class of livestock in each state by estimated feed concentrate requirements per animal under normal feeding practices in that state. The weights used are based on feeding practices as of 1941.

The *livestock price* series has no standard published counterpart. The coefficients relating it to other variables are realistic (according to statistical analyses) whether it is regarded as an index of prices of grain-consuming livestock only or of all livestock and livestock products. The level of this series was set in relation to that of the feed price series in rough correspondence with average hog-corn price ratios—between 12:1 and 13:1. The absolute level is arbitrary; its function in the model is that of a price index.

[7] Freight rates are a special problem in the present model because it is implicitly assumed that production and consumption of feed in each region are concentrated at a single point. As these points are mathematical fictions, the determination of appropriate freight charges between regions becomes somewhat arbitrary. One possibility would be to obtain specific railroad freight rates for corn between cities located near the center of feed production in each region. This would be expensive and time consuming, particularly if specific rates were to be calculated over unusual freight paths, as between two strongly deficit regions. The alternative chosen seems adequate for an exploratory study such as this.

It is assumed in Table II that the freight rate between any two regions is the same in both directions. This is frequently not true in practice and is not necessary for a solution of the spatial equilibrium system presented here. Also, it seems necessary for completeness to estimate freight rates between regions which are quite unlikely to have direct dealings with one another in the form of transportation of feed. Since these unusual or improbable paths of interregional shipment rarely figure in the equilibrium solution, the principal requirement is that the assumed freight rates for such paths be reasonably high, even though they may be lower than the specific rates which might be charged if someone wished to make an actual shipment between the regions in question. The distances under-

TABLE I.—BASIC DATA ON FEED SUPPLIES, LIVESTOCK NUMBERS, HUMAN POPULATION, AND DISPOSABLE INCOME BY REGIONS, UNITED STATES, 1949–50

Region	Supply of Feed Concentrates Available 1949–50[a] (Z_s^v)	Grain-Consuming Animal Units Fed, 1949–50 (Z_A)	Human Population April 1, 1950 (n^*)	Disposable Personal Income, 1950 Total[b]	Disposable Personal Income, 1950 Per Capita (y^*)
	(1)	(2)	(3)	(4)	(5)
	1,000 tons	1,000 units	Thousands	Million dollars	Dollars
Northeast	4,336	17,603	43,077	68,750	1,596
Corn Belt	54,697	62,005	27,322	40,721	1,490
Lake	15,393	20,216	12,832	18,141	1,414
Northern Plains	17,279	16,893	4,516	5,824	1,290
Appalachian	8,924	14,184	15,647	14,813	947
Southeast	4,783	8,981	11,410	10,457	916
Delta	2,869	6,364	6,810	5,625	826
Southern Plains	5,852	9,472	11,413	13,196	1,156
Mountain	3,085	3,638	3,654	4,849	1,327
Pacific	3,563	6,766	14,549	23,450	1,612
United States	120,781	166,122	151,228	205,826	1,361

[a] Available for livestock feeding after eliminating nonfeed uses and changes in year-end stocks.

[b] Adapted from published data on income payments to individuals by States by applying the published ratio of disposable income to income payments for the United States as a whole.

actual freight rates between specific points but are based on the following equations:

$$(3.1) \qquad X_{ij} = 5.6 \div 0.0168\, M_{ij}$$
$$(3.2) \qquad X_{ij} = 5.6 \div 0.0224\, M_{ij}$$
$$(3.3) \qquad X_{ij} = 5.6 \div 0.0280\, M_{ij}$$

where X_{ij} represents the freight rate on corn from Region i to Region j, in cents per bushel; and

M_{ij} represents the distance in miles between centers of grain-consuming livestock production in Regions i and j.

Equation (3.1) was used where the ICC data indicated relatively low

lying freight rates estimated from the equations are the shortest highway mileages between certain cities located near the center of livestock production in each region.

Equations (3.1) through (3.3) were chosen after examining the regressions of freight charges upon lengths of haul within and between a number of railroad territories. Moderately different equations could have been chosen without doing violence to the basic data or materially changing solutions obtained from the completed model.

TABLE II.—ESTIMATED FREIGHT RATE PER BUSHEL OF CORN BETWEEN CENTERS OF LIVESTOCK PRODUCTION IN EACH REGION, UNITED STATES, 1950[a]
(in dollars)

gion	North-east	Corn Belt	Lake	Northern Plains	Appa-lachian	South-east	Delta	Southern Plains	Moun-tain	Pacific
ast	0	0.2156	0.3125	0.3561[b]	0.2175	0.3464	0.3610[b]	0.4292[b]	0.5357[b]	0.6147[b]
elt	.2156	0	.1561	.1405	.1575	.2182	.1454	.2136	.3201	.3991
	.3125	.1561	0	.1633	.3136[b]	.3707	.3015[b]	.3697[b]	.3138	.3944
rn Plains	.3561[b]	.1405	.1633	0	.2980[b]	.3587[b]	.2859[b]	.2638	.2520	.4061
chian	.2175	.1575	.3136[b]	.2980[b]	0	.1554	.2433	.3711[b]	.4776[b]	.5566[b]
ast	.3464	.2182	.3707	.3587[b]	.1554	0	.1982	.3539	.5383[b]	.6173[b]
	.3610[b]	.1454	.3015[b]	.2859[b]	.2433	.1982	0	.2190	.4655[b]	.5445[b]
rn Plains	.4292[b]	.2136	.3697[b]	.2638	.3711[b]	.3539	.2190	0	.3489	.5054
ain	.5357[b]	.3201	.3138	.2520[b]	.4776[b]	.5383[b]	.4655[b]	.3489	0	.2976
	.6147[b]	.3991	.3944	.4061[b]	.5566[b]	.6173[b]	.5445[b]	.5054	.2976	0

d from equations shown in text; not actual freight rates.
shipment by way of the Corn Belt. For example, the freight rate from the Northern Plains to the Northeast is equal to the sum of (1) from the Northern Plains to the Corn Belt and (2) from the Corn Belt to the Northeast. Shipment over this "indirect" route is the "direct" route cost of $0.3618 as estimated from equation (3.2).

freight rates for corn in the railroad territories involved; equation (3.2) was used where an intermediate level of freight rates was indicated; and equation (3.3) was used where the data suggested a relatively high level of freight rates on corn as well as for all paths over which actual shipments of corn were improbable or rare.[8]

The freight rates for livestock (Table III) were similarly derived, using the following equations:

$$X_{ij} = 30 + 0.07\, M_{ij} \tag{4.1}$$
$$X_{ij} = 30 + 0.08\, M_{ij} \tag{4.2}$$
$$X_{ij} = 30 + 0.09\, M_{ij} \tag{4.3}$$

where X_{ij} represents the freight rate on livestock from Region i to Region j in cents per 100 pounds and the M_{ij} are the same as for feed.[9]

Demand and supply functions. For the United States as a whole, the model may be represented by the following equations:[10]

Demand for feed:

$$P_c = -0.7497 - 0.022353\, Q_c + 0.016253\, Z_h + 0.1250\, P_h \tag{5.1}$$

Supply of feed:

$$Z_c{}^* = 120.78 \tag{5.2}$$

Demand for livestock:

$$P_h = 35.2793 - 0.20226\, Q_h + 0.01111\, Y^* \tag{5.3}$$

Supply of livestock:

$$Z_h = 166.122 + 3.9700\, (P_h - 8\, P_c - 6) \tag{5.4}$$

"Gross" equilibrium conditions:

$$Q_c = Z_c{}^* \tag{5.5}$$
$$Q_h = Z_h \tag{5.6}$$

The arithmetic coefficients of the demand functions are adapted from

[8] In several cases, freight rates estimated from equations (3.3) or (3.2) proved to be higher than the sum of freight rates from Region i to the Corn Belt and from the Corn Belt to Region j, as most of the latter rates were estimated from equation (3.1). In these cases, the cost of shipping over the cheaper "indirect" route is taken as *the* freight rate from Region i to Region j.

[9] These rates were based on ICC data for live animals (hogs, cattle, and sheep) partly because data on other types of livestock products were limited and partly because the livestock price series used in the model was set at a level appropriate for live hogs.

[10] Capital letters are used in equations (5.1) through (5.6) to denote totals or averages

TIMATED FREIGHT RATE PER 100 POUNDS OF LIVESTOCK BETWEEN CENTERS OF LIVESTOCK PRODUCTION IN EACH REGION, UNITED STATES, 1950[a]

(in dollars)

Region	[illegible]	Corn Belt	Lake	Northern Plains	Appa-lachian	South-east	Delta	Southern Plains	Moun-tain	Pacific
Northeast	[illegible]	0.9650	1.2160	1.3920	0.8768	1.2333	1.5204	1.9216[b]	2.1585	2.6944[b]
Corn Belt	[illegible]	0	.6576	.6521	.7228	.8792	.6724	.9566	1.2432	1.7294
Lake	[illegible]	.6576	0	.6832	1.1460	1.3116	1.1649	1.3710	1.2208	1.7098
Northern Plains	[illegible]	.6521	.6832	0	1.2900	1.3926	1.0623	.9678	.9300	1.5504
Appalachian	[illegible]	.7228	1.1460	1.2900	0	.6195	.9021	1.3881	1.9002	2.4522[b]
Southeast	[illegible]	.8792	1.3116	1.3926	.6195	0	.7572	1.2576	1.9695	2.6086[b]
Delta	[illegible]	.6724	1.1649	1.0623	.9021	.7572	0	.8238	1.6257	2.1999
Southern Plains	[illegible]	.9566	1.3710	.9678	1.3881	1.2576	.8238	0	1.2414	1.7445
Mountain	[illegible]	1.2432	1.2208	.9300	1.9002	1.9695	1.6257	1.2414	0	1.0767
Pacific	[illegible]	1.7294	1.7098	1.5504	2.4522[b]	2.6086[b]	2.1999	1.7445	1.0767	0

[a] Estimated from e

[b] Involves shipmen

freight rates (1) fron

cheaper than the "di

n in text; not actual freight rates.

ne Corn Belt. For example, the freight rate from the Southern Plains to the Northeast is equal to the sum of

Plains to the Corn Belt and (2) from the Corn Belt to the Northeast. Shipment over this "indirect" route is

t of $1.8668 as estimated from equation (4.3).

because data on other types of livestock products were limited and partly because the livestock price series used in the model was set at a level appropriate for live hogs.

[10] Capital letters are used in equations (5.1) through (5.6) to denote totals or averages for the United States as a whole; lower-case letters are used in equations (1.1) through (2.6) to denote values for individual regions. Units of measure for Z_c*, Z_h, n*, and y* are indicated in Table I. P_c represents the price of corn in dollars per bushel (56 pounds) and P_h represents the price of livestock in dollars per 100 pounds, liveweight.

logarithmic analyses reported in an earlier article.[11] Equation (5.1) implies that the elasticity of demand for feed is −0.5 and that feed consumption tends to increase in direct proportion to livestock production. The coefficient of P_h in this equation assumes that about 8 bushels of feed (corn equivalent) are normally required to produce 100 pounds liveweight of livestock, and that, other things being equal, a given increase in the price of livestock per 100 pounds would be associated with an increase one-eighth as large in the price of feed per bushel. Equation (5.3) implies that the elasticity of demand for livestock is −0.5 and that livestock consumption increases about 0.45 per cent for each 1 per cent increase in disposable income per person. These percentage relations apply precisely only when the price of feed is set at $1.35 per bushel and the price of livestock at $16.80 per 100 pounds.

Equation (5.4) implies an "equilibrium" livestock production of 166.122 million units if the price of livestock per 100 pounds is equal to 8 P_c (the cost of 8 bushels of corn) plus $6.00, which is presumed to cover nonfeed costs of producing livestock. If the price of corn is $1.35 per bushel, the equilibrium price of livestock is $16.80 per 100 pounds. This relationship is about right if we think of "livestock" in terms of hogs, which are by far the largest consumers of feed concentrates. At the equilibrium prices specified, the price of livestock is 12.44 times the price of feed, or very close to the long-term average hog-corn price ratio.

Coefficients of the livestock supply equations were varied regionally on the basis of the relative importance of different classes of livestock and fragmentary information on supply elasticities for each class. The resulting elasticities of livestock supply ranged from 0.50 and 0.45 in the Corn Belt and Northern Plains regions, where the relatively flexible hog- and cattle-feeding enterprises predominate, to 0.25 in the Northeast and Pacific regions where fluid milk and eggs are the principal grain-consuming livestock products. In all other regions an inter-

Arithmetic demand and supply functions for each of the 10 regions were then specified in such a way as to reflect the price flexibilities and supply elasticities defined above under certain standard conditions ($p_c = \$1.35$, $p_h = \$16.80$, z_h at the levels given in Table I, column 2, and q_h at the United States average level of per capita livestock consumption.) It was necessary to choose arithmetic demand and supply functions, as the various equilibrium conditions are all in arithmetic terms.

The resulting regional demand functions for feed are shown in Table IV, the demand functions for livestock in Table V, and the supply functions for livestock in Table VI.

TABLE IV.—REGIONAL DEMAND FUNCTIONS FOR FEED UNDER APPROXIMATE 1949–50 CONDITIONS

(in million tons)

Region	Constant Term (1)	Change in Feed Consumption per Unit Change in: Feed Price (2)	Livestock Supply (3)	Livestock Price (4)
Northeast	− 3.5540	− 4.7405	0.7271	0.5925
Corn Belt	−12.5188	−16.6979	.7271	2.0871
Lake	− 4.0816	− 5.4442	.7271	.6805
Northern Plains	− 3.4107	− 4.5493	.7271	.5686
Appalachian	− 2.8637	− 3.8198	.7271	.4774
Southeast	− 1.8133	− 2.4186	.7271	.3023
Delta	− 1.2849	− 1.7138	.7271	.2142

flexible hog- and cattle-feeding enterprises predominate, to 0.25 in the Northeast and Pacific regions where fluid milk and eggs are the principal grain-consuming livestock products. In all other regions an intermediate figure of 0.35 appeared reasonable.[12]

[11] K. A. Fox, "Factors Affecting Farm Income, Farm Prices and Food Consumption," *Agr. Econ. Research*, July 1951, III, 65-82.

[12] Supply elasticities are best defined in relation to the particular time intervals allowed for response. Supply coefficients in the present model allow (perhaps liberally) for the sort of adjustments which might take place within a given feeding year. It would be better for some purposes to use a lagged model such as that developed on the national level by R. J. Foote. ("A Four-equation Model of the Feed-livestock Economy and its Endogenous Mechanisms," *Jour. Farm. Econ.*, Feb. 1953, xxxv, 44-61). In such a model, livestock numbers and prices would be taken as predetermined variables in solving a feed model applicable to the early part of the feed-marketing year, during which the livestock economy would have little opportunity to respond to the new feed harvest. The

TABLE V.—REGIONAL DEMAND FUNCTIONS FOR LIVESTOCK UNDER APPROXIMATE 1949–50 CONDITIONS
(in million units)

Region	Constant Term (1)	Change in Livestock Consumption per Unit Change in: Livestock Price (2)	Per Capita Disposable Income (3)
Northeast	49.6822	−1.4083	0.015646
Corn Belt	31.5134	− .8932	.009924
Lake	14.8002	− .4195	.004661
Northern Plains	5.2087	− .1476	.001640
Appalachian	18.0475	− .5116	.005683
Southeast	13.1600	− .3730	.004144
Delta	7.8545	− .2226	.002474
Southern Plains	13.1634	− .3731	.004145
Mountain	4.2145	− .1195	.001327
Pacific	16.7805	− .4756	.005284
United States	174.4246	−4.9441	.054929

equal to the difference between their freight rates to the deficit region. Thus, an equilibrium solution implies for each commodity a precise structure of regional prices bound together by specific freight rates, except for regions which prove to be self-sufficient under the given conditions.

Northern Plains	[illegible]	[illegible]	[illegible]	[illegible]
Appalachian	− 2.8637	− 3.8198	.7271	.4774
Southeast	− 1.8133	− 2.4186	.7271	.3023
Delta	− 1.2849	− 1.7138	.7271	.2142
Southern Plains	− 1.9124	− 2.5508	.7271	.3188
Mountain	− 0.7345	− 0.9797	.7271	.1225
Pacific	− 1.3661	− 1.8221	.7271	.2277
United States	−33.5400	−44.7367	.7271	5.5916

II. *Equilibrium Solutions*

A necessary requirement for competitive equilibrium is that no individual can make a profit by shipping additional quantities of either feed or livestock from one region to another. If one region ships to another, the prices must differ by the amount of the intervening transportation costs. If two surplus regions ship to the same deficit region, the difference between equilibrium prices in the surplus regions will be

early-season prices of feed and livestock would then be taken as predetermined variables in solving for livestock production and prices in the latter part of the marketing year.

Longer-run incidence problems could be handled in a simultaneous model like that of the present paper. However, the regional supply functions would probably be based on long-run profit considerations rather than upon empirical studies of supply response. The present model also disregards speculative and other factors which might affect livestock and feed prices during periods materially shorter than a year.

(1.3), we can select by inspection a trading arrangement which looks reasonable, even though it will not necessarily prove to be the equilibrium arrangement. (An "arrangement" simply specifies which regions ship or do not ship to which other regions.) The assumed trading arrangement implies a perfectly definite structure of price differentials in which any one regional price can be taken as the basing point. In practice, the Corn Belt was taken as the basing point and feed prices in other regions were lined up in accordance with their differentials above and below an assumed price in the Corn Belt. Then, using the specified demand functions for feed in each region, the consumption of feed in each of the 10 regions was calculated on the basis of the assumed price in the Corn Belt (in this case $1.40 per bushel). The total feed consumption at this level of prices did not exhaust the available supply—that is, it did not meet the "gross" equilibrium condition. Since the assumed rigid structure of price differentials made total United States feed consumption a linear function of the Corn Belt price, the price adjustment needed to equate United States feed consumption with the available supply could be calculated at once. This

except for regions which prove to be self-sufficient under the given conditions.

To solve the feed model represented by equations (1.1) through

TABLE VI.—REGIONAL SUPPLY FUNCTIONS FOR LIVESTOCK UNDER APPROXIMATE 1949–50 CONDITIONS
(in million units)

Region	Constant Term (1)	Change in Livestock Supply per Unit Change in: Feed Price (2)	Livestock Price (3)
Northeast	16.0316	− 2.0952	0.2619
Corn Belt	50.9326	−14.7632	1.8454
Lake	17.6888	− 3.3696	.4212
Northern Plains	14.1780	− 3.6200	.4525
Appalachian	12.4110	− 2.3640	.2955
Southeast	7.8584	− 1.4968	.1871
Delta	5.5684	− 1.0608	.1326
Southern Plains	8.2882	− 1.5784	.1973
Mountain	3.1832	− .6064	.0758
Pacific	6.1618	− .8056	.1007
United States	142.3020	−31.7600	3.9700

...R FEED PRICES, CONSUMPTION, AND ...9–50 CONDITIONS[a]

Net Trade (5)	Origins and Amounts of Net Imports: Corn Belt (6)	Northern Plains (7)	Mountain (8)	Total (9)
Million tons	Million tons	Million tons	Million tons	Million tons
−7.66	7.66			7.66
8.84		(2.71)[b]		
0.00				
4.15				
−0.96	0.96			0.96
−1.34	1.34			1.34
−1.59	1.59			1.59
−0.84		0.84		0.84
−0.36				
−0.96		0.60	0.36	0.96
0.00	11.55[c]	4.15	0.36	13.35[d]

...s fixed at $16.80 per 100 pounds in all regions.
...he Corn Belt and reshipped to deficit regions in addition to the
... regions.

price, the price adjustment needed to equate United States feed consumption with the available supply could be calculated at once. This adjustment gave the equilibrium price in each region (assuming the specified arrangement) and the equilibrium rate of feed consumption.

A comparison of these regional feed consumption estimates with the given values of feed production yields the net imports or exports of each region. In conjunction with the assumed arrangement, the estimated quantity of feed shipped over each interregional path can be worked out. The arrangement is then tested for the equilibrium requirement that no trader can make a profit by shipping additional feed from one region to another. If this condition is met, the assumed arrangement is also the final one. If not, it is usually very easy (in a 10-region model) to modify the trading arrangement in such a way as to eliminate any remaining profit possibilities.

This approach was adapted to the present joint feed and livestock model as follows: (1) A separate equilibrium arrangement was determined for feed by assuming that the livestock numbers in Table I were given and that livestock prices in all regions were \$16.80. The resulting arrangement is shown in Table VII. Then we determined a similar independent arrangement for livestock, assuming livestock numbers fixed. This arrangement is shown in Table VIII. These arrangements imply definite structures of regional price differentials for both feed and livestock.

As a next step, the livestock prices from Table VIII were substituted into the demand equations for feed, yielding a revised equilibrium solution for feed. This revised solution for feed, in conjunction with Table VIII, would represent the joint spatial equilibrium solution we are

...CONSUMPTION

...nd Amounts of Net Imports

Northern Plains (8)	Delta (9)	Total (10)
Million units	Million units	Million units
		32.91
		0.60
	0.09	1.62
2.12		2.12
0.30		0.30
9.52		10.14
11.94	0.09	47.69

TABLE VII.—INDEPENDENT EQUILIBRIUM SOLUTION FOR FEED P NET TRADE UNDER APPROXIMATE 1949–50 CO

Region	Differential from Corn Belt (1)	Equilibrium Price (2)	Feed Consumption (3)	Feed Production (4)	N Tr (5
	Dollars per bushel	Dollars per bushel	Million tons	Million tons	Mil to
Northeast	.2156	1.5190	12.00	4.34	−7.
Corn Belt	.0000	1.3034	45.86	54.70	8.
Lake	−.0806	1.2228	15.39	15.39	0.
Northern Plains	−.1405	1.1629	13.13	17.28	4.
Appalachian	.1575	1.4609	9.89	8.93	−0.
Southeast	.2182	1.5216	6.12	4.78	−1.
Delta	.1454	1.4488	4.46	2.87	−1.
Southern Plains	.1233	1.4267	6.69	5.85	−0.
Mountain	−.0320	1.2714	2.72	3.08	0.
Pacific	.2656	1.5690	4.52	3.56	−0.
Total			120.78	120.78	0.

[a] Assumes livestock numbers fixed at levels shown in Table I, and livestock prices fixed a

[b] Under the assumed structure of freight rates, this amount of feed is shipped to the Corn 8.84 million tons classified as *net* exports from the Corn Belt.

[c] Includes 2.71 million tons received from Northern Plains and reshipped to other regions.

[d] Excludes 2.71 million tons of imports into the Corn Belt offset by re-exports.

seeking *if livestock production in each region were predetermined.* But as livestock production is a jointly dependent variable in our model, we proceed to substitute the regional prices for feed and livestock into the regional supply functions for livestock. If the sum of the resulting regional livestock production estimates is not equal to 166.12, we make a "gross" adjustment as follows:

For the nation as a whole (assuming rigid price differentials) we transform equations (5.1), (5.3) and (5.4) respectively into

(6.1) $\Delta Z_h = 61.5271\ \Delta P_c - 7.6909\ \Delta P_h$ (demand for feed)

(6.2) $\Delta Q_h = -4.9441\ \Delta P_h$ (demand for livestock)

(6.3) $\Delta Z_h = -31.7600\ \Delta P_c + 3.9700\ \Delta P_h$ (supply of livestock),

where the Δ's represent changes in the variables from their initial

...ports	
...n- ...n	Total (10)
...on ...s	Million tons
	7.88
	1.04
	1.39
	1.49
	1.00
...5	1.17
...5	13.97[a]

Table VIII.—Independent Equilibrium Solution for Livestock Prices, Consump... and Net Trade under Approximate 1949–50 Conditions[a]

Region	Differential from Corn Belt (1)	Equilibrium Price (2)	Livestock Consumption (3)	Livestock Production (4)	Net Trade (5)	Origins and Amou... Corn Belt (6)	Lake (7)	Nor... Pl...
	Dollars per 100 lbs.	Dollars per 100 lbs.	Million units	Million units	Million units	Million units	Million units	M... u...
Northeast	.9650	17.1410	50.51	17.60	−32.91	28.02	4.89	
Corn Belt	.0000	16.1760	31.85	62.00	30.15			
Lake	−.2510	15.9250	14.71	20.22	5.51			
Northern Plains	−.0916	16.0844	4.95	16.89	11.94			
Appalachian	.7228	16.8988	14.78	14.18	− 0.60	0.60		
Southeast	.8792	17.0552	10.60	8.98	− 1.62	1.53		
Delta	.1220	16.2980	6.27	6.36	0.09			
Southern Plains	.8762	17.0522	11.59	9.47	− 2.12			2...
Mountain	.8384	17.0144	3.94	3.64	− 0.30			0...
Pacific	1.4588	17.6348	16.91	6.77	−10.14		0.62	9...
Total			166.12	166.12	0.00	30.15	5.51	11...

[a] Assumes livestock numbers fixed at levels shown in Table I.

Note: Figures may not check in the last decimal place because of rounding.

(6.2) $\Delta Q_h = \quad 4.9441 \, \Delta P_h$ (demand for livestock)

(6.3) $\Delta Z_h = -31.7600 \, \Delta P_c + 3.9700 \, \Delta P_h$ (supply of livestock),

where the Δ's represent changes in the variables from their initial values.[13]

As Z_h in equation (6.1) and Q_h in equation (6.2) were chosen equal in the independent livestock and feed solutions, any *changes* in these two variables to reach a final joint equilibrium must also be equal. This implies the relationship $\Delta P_h = 22.3996 \, \Delta P_c$ (obtained by solving equations (6.1) and (6.2) under the condition that ΔZ_h equals ΔQ_h).

Suppose that, on substituting the initial sets of livestock and feed prices into the regional livestock supply functions, we find that the resulting estimate of total United States supply is equal to $Q_h - 2$. We shall call this supply estimate Z_h (3), to denote that it is associated with equation (6.3). Then, to reach equilibrium, Z_h (3) must increase and Q_h must decrease in such a way that ΔZ_h (3) $-\Delta Q_h = 2$. The extent of the change in each variable is easily calculated from the equations shown. The changes in Z_h (3) and Q_h imply that the price of feed in each region must change by a constant amount and that the price of livestock in each region must change by another constant amount. When these changes are made, the system is in "gross" equilibrium. If this step causes a change in the equilibrium trading arrangements for either feed or livestock, some further minor adjustments are needed to complete the joint equilibrium solution.

The joint equilibrium solution under approximate 1949-50 conditions is shown in Table IX. The trading arrangement for feed is simple and logical in most respects. The Corn Belt ships feed to four deficit regions, namely the Northeast, Southeast, Appalachian and Delta. Prices in these regions are equal to the Corn Belt price plus freight. The Lake Region supplies part of the feed requirements of the Northeast and its price is equal to the price in the Northeast region minus freight. The Northern Plains region ships feed to the Pacific and

[13] The transformation consists simply of solving each of the original equations for Z_h or Q_h and passing to first differences. The latter change eliminates all constant terms and those variables whose United States totals are predetermined, specifically Q_o and Y^*.

t Imports
Total (19)
Million units
33.15
0.77
1.78
2.15
0.23
10.23
48.31

addition to the

TABLE IX.—JOINT SPATIAL EQUILIBRIUM FOR FEED AND LIVESTOCK UNDER APPROXIMATE 1949–50 CONDITIONS

A. Feed

Region	Differential from Corn Belt (1)	Equilibrium Price (2)	Feed Consumption (3)	Feed Production (4)	Net Trade (5)	Origins and Amounts of Net Imports: Corn Belt (6)	Lake (7)	Northern Plains (8)	Mountain (9)
	Dollars per bushel	Dollars per bushel	Million tons	Million tons	Million tons	Million tons	Million tons	Million tons	Million tons
Northeast	.2156	1.4796	12.22	4.34	−7.88	7.73	0.15		
Corn Belt	.0000	1.2640	45.18	54.70	9.52			(2.13)[a]	
Lake	−.0969	1.1671	15.24	15.39	0.15				
Northern Plains	−.1405	1.1235	13.23	17.28	4.05				
Appalachian	.1575	1.4215	9.96	8.92	−1.04	1.04			
Southeast	.2182	1.4822	6.17	4.78	−1.39	1.39			
Delta	.1454	1.4094	4.36	2.87	−1.49	1.49			
Southern Plains	.1233	1.3873	6.85	5.85	−1.00			1.00	
Mountain	−.0320	1.2320	2.84	3.09	0.25				
Pacific	.2656	1.5296	4.73	3.56	−1.17			0.92	0.25
Total			120.78	120.78	0.00	11.65[b]	0.15	4.05	0.25

B. Livestock

Region	Differential from Corn Belt (11)	Equilibrium Price (12)	Livestock Consumption (13)	Livestock Production (14)	Net Trade (15)	Origins and Amounts of Net Imports: Corn Belt (16)	Lake (17)	Northern Plains (18)
	Dollars per 100 pounds	Dollars per 100 pounds	Million units	Million units	Million units	Million units	Million units	Million units
Northeast	.9650	17.1045	50.56	17.41	−33.15	27.63	5.52	
Corn Belt	.0000	16.1395	31.88	62.06	30.18			
Lake	−.2510	15.8885	14.73	20.45	5.72			
Northern Plains	−.0916	16.0479	4.96	17.37	12.41			
Appalachian	.7228	16.8623	14.80	14.03	− 0.77	0.77		
Southeast	.8792	17.0187	10.61	8.83	− 1.78	1.78		
Delta	.2900	16.4295	6.25	6.25	0.00			
Southern Plains	.8762	17.0157	11.61	9.46	− 2.15			2.15
Mountain	.8384	16.9779	3.95	3.72	− 0.23			0.23
Pacific	1.4588	17.5983	16.93	6.70	−10.23		0.20	10.03
			166.28	166.28	0.00	30.18	5.72	12.41

[a] Under the assumed structure of freight rates, this amount of feed is shipped to the Corn Belt and reshipped to deficit regions in addition
9.52 million tons classified as *net* exports from the Corn Belt.

[b] Includes 2.13 million tons received from Northern Plains and reshipped to other regions.

[c] Excludes 2.13 million tons of imports into the Corn Belt offset by re-export.

Southern Plains regions, with the Mountain region serving as an auxiliary source of supply for the Pacific. The only additional item needed is a link connecting these two systems. In this case it turns out that the Corn Belt in equilibrium would import some feed from the Northern Plains and re-export an equivalent amount to other regions. Hence, the link is provided by the fact that the price in the Corn Belt is equal to that in the Northern Plains plus freight. The total net interregional trade, exclusive of re-exports, is 13.97 million tons, or about 12 per cent of the total feed concentrate supply.

The three major surplus regions with respect to feed also prove to be surplus with respect to livestock. The Northeast is by far the largest importer of grain-consuming livestock and the Pacific region ranks second. In equilibrium, the Corn Belt ships livestock to the Northeast, Appalachian, and Southeast regions. Prices in these regions are equal to the Corn Belt price plus freight. The Lake Region supplies the remaining requirements of the Northeast, but it also ships a small part of its export supplies to the Pacific region. Hence, the price of livestock in the Lake region is equal to the Northeast price minus freight, and the Pacific price is in turn equal to the Lake price plus freight. The Pacific region gets the great bulk of its livestock imports from the Northern Plains, so that the price in the latter region is equal to the Pacific price minus freight. In addition, the Northern Plains supplies the import requirements of the Southern Plains and Mountain regions so that their prices are equal to the Northern Plains plus freight. The Delta region proves in this model to be self-sufficient with respect to livestock.

Total net interregional shipments of livestock products are estimated as equivalent to 48.31 million grain-consuming animal units, or about 29 per cent of the total production of grain-consuming livestock and products.

Table X compares the net trade estimates obtained from the joint equilibrium model with estimates based on simpler "common sense" assumptions. Columns (1) and (2) compare the quantity of feed produced in each region with the quantity needed to feed its actual 1949-50 livestock numbers at the U.S. average rate. The feed surpluses and deficits implied by this comparison are shown in column (3) and the net imports and exports resulting from the joint equilibrium model are shown in column (4). The correspondence is obviously close.

Column (6) shows the regional distribution of livestock consumption if per capita rates in each region were the same as for the United States as a whole. Column (7) redistributes these regional livestock consumption estimates by adjusting them for regional differences in per capita disposable income. It is assumed, based on both time-series and family-

budget analyses, that a departure of 10 per cent from the national average in per capita disposable income will be associated with a departure of 4 per cent in per capita consumption of livestock products. Columns (8) and (9) show a close correspondence between the livestock net trade estimates obtained in this fashion and those obtained from the joint equilibrium model.

These comparisons do not prove that the model accurately portrays the interregional trade pattern of the real world (much of which is unknown due to inadequate data), but they at least suggest that the model and the manipulations applied to it involve no serious mechanical or arithmetical imperfections.

Equilibrium solutions were also calculated on the basis of various changes in the initial data. The results of two of these solutions will serve to illustrate the flexibility and usefulness of the model.

A. *Effects of a severe drought.* In one variation, feed supplies were assumed to decline about 30 per cent in the Corn Belt and 75 per cent in the Northern Plains. These drops were closely comparable with the actual changes from 1935 to 1936. Feed supplies in other regions were assumed to be unchanged.

In the equilibrium solution, the original trading arrangement for feed was drastically altered. The Southeast region became self-sufficient, neither importing nor exporting feed. The Northern Plains became a major feed-deficit area, drawing supplies from the Lake, Corn Belt, and Mountain regions. The Appalachian region shifted to a surplus status, shipping to the Northeast. The Southern Plains also moved to a surplus position, shipping a small quantity of feed to the Delta region. Feed prices in the Northern Plains rose 28 cents a bushel relative to prices in the Corn Belt; altogether, 7 of the 9 regional price differentials from the Corn Belt were changed by the drought situation. Net interregional trade in feed dropped more than 25 per cent.

The original trading arrangement for livestock was not changed by the assumed drought, although two regions narrowly missed shifting from a deficit to a self-sufficient status. The drought situation found the Appalachian and Mountain regions importing less than 1 per cent of their livestock requirements, compared with 5 or 6 per cent in the 1949-50 solution. The Delta region remained self-sufficient in the drought situation, but its livestock price declined relative to that in the Corn Belt. All other livestock price differentials remained as in the 1949-50 solution. Net interregional trade in livestock declined about 12 per cent, less than half as much as did interregional shipments of feed.

This type of solution should be helpful in appraising the incidence of future droughts upon livestock producers in different regions and in

TABLE X.—JOINT EQUILIBRIUM ESTIMATES OF NET TRADE IN LIVESTOCK AND FEED COMPARED WITH ESTIMATES BASED ON SIMPLER ASSUMPTIONS

Region	Feed				Livestock				
	Production	"Average" Consumption[a]	Net trade		Production	Consumption		Net Trade	
			"Expected" (1)–(2)	Equilibrium		"Average"[b]	"Average" adj. for Income Levels[c]	"Expected" (5)–(7)	Equilibrium
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Million tons	Million tons	Million tons	Million tons	Million units	Million units	Million units	Million units	Million units
Northeast	4.34	12.80	−8.46	−7.88	17.41	47.35	50.63	−33.22	−33.15
Corn Belt	54.70	45.05	9.65	9.52	62.06	30.05	31.18	30.88	30.18
Lake	15.39	14.74	0.65	0.15	20.45	14.10	14.31	6.14	5.72
Northern Plains	17.28	12.32	4.96	4.05	17.37	4.97	4.87	12.50	12.41
Appalachian	8.92	10.27	−1.35	−1.04	14.03	17.21	15.11	− 1.08	− 0.77
Southeast	4.78	6.52	−1.74	−1.39	8.83	12.53	10.89	− 2.06	− 1.78
Delta	2.87	4.59	−1.72	−1.49	6.25	7.48	6.31	− 0.06	0.00
Southern Plains	5.85	6.88	−1.03	−1.00	9.46	12.56	11.81	− 2.35	− 2.15
Mountain	3.09	2.66	.43	0.25	3.72	4.03	3.99	− 0.27	− 0.23
Pacific	3.56	4.95	−1.39	−1.17	6.70	16.00	17.18	−10.48	−10.23
Total	120.78	120.78	0.00	0.00	166.28	166.28	166.28	0.00	0.00

[a] Assumes the U. S. average rate of feed consumption per animal unit in each region.
[b] Assumes the U. S. average rate of per capita consumption in each region.
[c] Assumes that a departure of 10 per cent from the national average level of disposable income is associated with a departure of 4 percent from the national average consumption of livestock products.

evaluating the benefits of feed grain storage programs. A related application involves estimating the pattern of feed prices and shipments likely to emerge at harvest time on the basis of advance forecasts of feed production in each region.[14]

B. *Effect of an increase in freight rates for feed.* An assumed increase of 50 per cent in all freight rates for feed changes the 1949-50 trading arrangement in only one respect—the Lake region shifts from a surplus to a self-sufficient status with respect to feed. However, substantial changes occur in feed price differentials and in the volume of interregional feed shipments.

The effects of the freight rate increase can be shown more clearly if we first assume that livestock numbers and prices in each region are held constant at their 1949-50 joint equilibrium levels. It is obvious that the change in freight rates will increase the feed price spreads between surplus and deficit regions. For example, feed prices in the Pacific region are increased about 11 cents a bushel and those in the Northern Plains are reduced about 9 cents a bushel. These price changes also have consequences for consumption and interregional trade. The Pacific region will consume less feed at the new higher price, and the Northern Plains will retain more feed at the new lower price. Thus, imports into each deficit region and exports from each surplus region are reduced by varying amounts. The over-all reduction in interregional trade in feed is about 8 per cent under the present assumptions.

When livestock prices and production are permitted to vary, however, further consequences become evident. Livestock production decreases slightly in the feed deficit regions and expands a little in the feed surplus regions. The regional adjustments in livestock production are such as to reduce interregional shipments of feed another 7 per cent. The final effect of the assumed increase in freight rates for feed is (in the present model) to reduce interregional feed shipments by nearly 15 per cent from the 1949-50 joint equilibrium level. Thus, the increase in freight revenues from feed is only 25 or 30 per cent rather than the 50 per cent which might have been anticipated in the absence of demand and supply adjustments.

III. *Applicability of Spatial Equilibrium Models to Other Commodities and Types of Market Structures*

Spatial equilibrium models have considerable appeal in that they include all of the elements—demand functions, supply functions, and transport costs—which are theoretically required for solving inter-

[14] Such forecasts or "early season indications" are published by the Department of Agriculture at monthly intervals during the growing season. A forecasting application of the independent feed model was presented in the earlier paper by Fox. (See footnote 2.)

regional pricing and trade problems at the industry level. It is our impression that many freight-rate problems are conceived in terms of rates to a given destination from two or three competing sources, and that indirect effects on the rest of the economy are disregarded. These effects may indeed be small in most cases, but they can only be checked by constructing a model which explicitly provides for their measurement. Similarly, we suspect that in estimating regional deficits or surpluses few marketing firms take explicit account of the slopes of regional demand curves.

For example, an assumption of equal per capita consumption in all regions would be appropriate (1) if transport costs were zero and (2) if all demand and supply functions were completely inelastic.[15] Hence, the gain in knowledge resulting from a more complete model increases with the importance of transportation costs (relative to commodity price) and with increasing elasticities of supply and demand.

The stability of trading patterns and price differentials for a given commodity from year to year depends on the above factors and also upon the degree of regional specialization—that is, upon the size of the net trade of each region relative to its total production or consumption of the commodity. It may be perfectly obvious that some regions will retain their surplus positions under almost any conceivable circumstances. But a region which imports less than 5 per cent of its requirements in normal years may well shift to a self-sufficient or even a surplus position on occasion, involving sharp price changes relative to other regions.

Spatial equilibrium models should be useful in understanding the price and trade pattern of any farm product or industrial raw material which is characterized by competitive markets and continuously varying prices. They are obviously applicable to international as well as to interregional market structures.[16] They can be extended to groups of three or more related products; the relationships may be either competitive or complementary in demand, supply, or both. (The livestock-feed model illustrates a derived demand or raw material and finished product relationship).

Some of the short cuts used in the livestock-feed model depended upon the assumed linearity of the demand and supply functions. How-

[15] Strictly speaking, the assumption that per capita income and other relevant variables are the same in all regions is also implicit.

[16] Some applications to international trade problems are given in K. A. Fox, "The Use of Economic Models in Appraising International Trade Policies," *Jour. Farm Econ.*, Dec. 1954, XXXVI, 944-58. Effects of changes in tariffs, subsidies, import quotas and price-support programs are illustrated in terms of a model similar to that of Table VII.

ever, curvilinear functions should not greatly increase the difficulty of solution.[17]

The applicability of spatial equilibrium models to products with administered prices is less obvious. However, the aggregate demand curve for such a product in each region can be regarded as a continuous function. The marginal cost curve of each plant (or the industry marginal cost curve if there were several plants operating in a given region) could be either a continuous function or a series of steps. If there were only a few plants producing a given commodity, each plant might be treated as a surplus "region" with zero consumption and each consuming center might be treated as a deficit region with zero production. The maximization criterion could be varied according to the competitive structure of the industry. For example, if one firm held a nationwide monopoly but operated plants in several locations, it would be possible to calculate a price, output and shipment pattern which would maximize monopoly profit.[18] On the other hand, if each plant were owned by a different firm, a solution could be obtained under which each firm maximized its returns by equating marginal net revenue (f.o.b. plant) from all markets to which it could ship profitably. Appropriate maximization criteria could also be applied to an industry in which each of two or more firms operated plants at a number of locations.[19]

Thus, the chief limitation of the spatial equilibrium model with respect to administered-price commodities is that it does not accurately express the mechanism by which actual prices are determined. Nevertheless, given the necessary information about demand and cost curves, the spatial equilibrium model indicates an optimum price and trade pattern which could be a useful guide in setting administered prices. It can also indicate the pressures on an existing market pattern which would result from the construction of new plants at specified locations.

Conceptually, the spatial equilibrium model is one of very wide applicability. It is not excessively difficult to manipulate. The most serious

[17] Theoretically, some types of curves might lead to multiple solutions. But this is not likely to happen with functions of realistic shape, such as monotonically decreasing demand curves and horizontal, vertical, or monotonically increasing supply curves.

[18] This is not to suggest that firms do, should, or can maximize monopoly profit without regard to other considerations. Conceptually, any limitations on the pursuit of profit which were set by public authorities or by company policy could be incorporated into the model. The model could also be used to estimate the pattern which would result if the various units of such a firm were operated competitively.

[19] Maximization could be carried out subject to various policy constraints relating to price leadership, market shares, and so forth. Here again the spatial equilibrium model is both neutral and flexible.

limitation upon its use is independent of the model as such, namely the difficulty of determining the individual demand and supply or cost functions. Statistical demand functions for many farm and food products have been determined with considerable reliability, and there is no conceptual barrier to their derivation for industrial products. In determining prices, large firms must now consider on a judgment basis information which is logically related, or even equivalent, to market demand functions. It seems reasonable to believe that the decisions of such a firm could be improved if these intuitive judgments about demand in various markets were formalized into demand functions and these in turn combined into a model of the entire market structure in which it was interested.

The success of operations-research groups in applying the "transportation" and "contract award" models to practical problems suggests that experiments with the spatial equilibrium model might be both instructive and profitable. The other two models deal only with limited aspects of a firm's activities or even with individual procurement operations. The spatial equilibrium model, on the other hand, can encompass broad economic characteristics of an industry which condition the success of major policy decisions by the firms within it or by public bodies whose regulatory activities impinge upon it.

SOVIET PRICE REDUCTIONS FOR CONSUMER GOODS, 1948-1954

By Colin D. Campbell and Rosemary G. Campbell*

The earliest reference to Soviet price reductions is a statement by Stalin in 1946 that "special attention will be devoted to expanding the production of consumers' goods, [and] to improving the living standards of the workers through consistent price reductions on all commodities."[1] Although the Soviet government raised prices of many consumer goods in 1946, and the fourth five-year plan directive, which was published a month after Stalin's statement, did not mention price reductions, the Soviet government has lowered the prices of a large number of consumer goods each spring from 1948 to 1954. The fifth five-year plan directive in 1952 prescribed that:

> Retail prices of consumers' goods should continue to be reduced steadily, bearing in mind that lowering the prices is the chief means of systematically raising the real wages of the workers and employees and increasing the incomes of the peasants.[2]

For the first time since 1948, price reductions were not announced in March or April 1955. This may represent a change in price policy; however, it could also be due to the fact that the 1951-55 goal for price reductions was reached during the first four years of the fifth five-year plan.

The decline in prices during the past seven years is strikingly different from the trend of prices in the USSR prior to the second world war. Many Western economists have believed that planned economies would be bothered by rising prices. Hoover writes:

> While the prevention or cure of unemployment and depression is quite simple in a Soviet type of economy, the danger of inflation is always more real. This flows out of the circumstance that, from the standpoint of national planning, global underemployment of resources is likely

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[1] V. Moskvin, "Retail Price Reductions and Soviet Trade," *Curr. Dig. Sov. Press*, Apr. 14, 1951, III, 30.

[2] "Party Draft Directives on Fifth Five-Year Plan," *Curr. Dig. Sov. Press*, Sept. 13, 1952, IV, 8.

to exist only if there is an underestimate of the potential volume of production. Planners can always think of useful and even grandiose ways in which to allocate limited national resources. Since people in general want their wages and salaries increased, as well as their leisure, while they are always anxious to have prices of goods and services lowered, as well as anxious that the deductions by the economic system in the form of taxes for all purposes should be as low as possible, it is usually more likely that economic planners will err in the direction of disbursing more income than the planned utilization of the national resources will warrant.[3]

Gerschenkron also has stated that the postwar deflation in the Soviet Union may not last. He writes:

> As was the case in the thirties, the Soviet government, faced with the necessity of maintaining labor incentives and unable to provide real increases in the population's purchasing power because of the high rate of nonconsumption, may be driven once more to provide the *semblance* of such increases in the form of inconvertible increases in money wages. It is just possible that the current year 1952 will form the dividing line between the years of past deflation and those of coming inflation.[4]

This paper gathers together information about the price reductions from translated articles appearing in *The Current Digest of the Soviet Press*. The articles in the Soviet press are interesting not only because they help to explain the price reductions, but also because they throw some light on the nature of the Soviet pricing system for consumer goods.

I. *The Factors Making Price Reductions Possible*

Soviet leaders claim that they have been able to reduce prices because of large increases in output and lower costs. The 1950 price reduction decree states:

> In connection with new successes in industrial and agricultural production during 1949 and with increased labor productivity and reduced production costs, the Soviet government and the Communist Party Central Committee deem it possible to carry out, as of March 1, 1950, a new, third, reduction of state retail prices on foodstuffs and manufactured consumers' goods.[5]

However, the annual price reductions cannot be explained solely by the

[3] C. B. Hoover, "Soviet Economic Policies at Home and Abroad," *Proceedings, Acad. Pol. Sci.*, Jan. 1947, XXII, 115.

[4] A. Gerschenkron, "Comments on 'National Income' by Gregory Grossman," A. Bergson, ed., *Soviet Economic Growth* (Evanston, 1953), p. 30.

[5] "Price Cuts and the Gold Standard," *Curr. Dig. Sov. Press*, Apr. 15, 1950, II, 16.

rapid increase in the output of consumer goods. They have been possible in part because the government has at the same time stabilized money wages. Since the second world war, the government has not resumed its prewar policy of continuously raising money wages, and it has strictly controlled payroll allocations to industries. The expansion in total money income due to growth in the size and skill of the labor force has been small compared to the increase in the output of goods. The 1954 price reductions perhaps show that large annual price cuts depend on the successful stabilization of money incomes. That the 1954 reductions were the smallest of those that have been granted is probably due to the fact that in 1953 money incomes were raised by cutting in half the contributions to the state loan, reducing the agricultural tax, and raising procurement prices for agricultural produce.

Soviet monetary policy has probably been consistent with their deflationary price policy, although no direct information is available on the money supply during the past seven years.[6] Because of the dual marketing system, a successful policy of price reductions in the state stores would probably be impossible under inflationary monetary conditions. Although the bulk of retail sales are made by state and co-operative stores where prices are set or directly influenced by government decree, there are also some free markets where fresh foods—fruits, vegetables, meats, and dairy products—are sold at uncontrolled prices.[7] If the quantity of money had been rapidly expanding, the gap between the fixed state prices and the uncontrolled prices would have grown larger, shortages in the state stores would have become acute, and the illicit resale of state merchandise would have been extremely difficult to control.

The Soviet monetary reform in December 1947 contributed to the postwar deflation by preventing a rise in the rate of spending when rationing was removed. Prior to the reform the real purchasing power of the large cash holdings of the populace was not large because uncontrolled prices were very high and ration points were needed in addition to cash to purchase the lower priced goods in state stores. When rationing was removed and uncontrolled prices fell, the real value of the cash holdings of the populace would have risen sharply if the government had not reduced money balances.

[6] Budget surpluses have been large since the second world war. There were small budget surpluses during the 1930's, but there was a large increase in the money supply probably because of an expansion of bank credit. See F. D. Holzman, "The Soviet Budget, 1928-1952," *Nat. Tax Jour.*, Sept. 1953, VI, 247, and A. Baykov, *The Development of the Soviet Economic System* (New York, 1948), p. 421.

[7] Janet Chapman has estimated that in 1948 the free markets handled approximately 15 per cent of total retail trade. See "Real Wages in the Soviet Union, 1928-1952," *Rev. Econ. Stat.*, May 1954, XXXVI, 135.

Soviet writers also state that the government has temporarily sacrificed budget revenues in order to reduce prices. If prices had not been cut, either turnover tax receipts or profits would have been larger.[8] The 1949 price reduction decree states:

> This first stage resulted in making goods sold in state retail trade cheaper by at least 57 billion rubles in the course of a year. This sum represents a pure loss to the state budget. The loss had to be covered, and was actually covered subsequently by the government, thanks to a growth in labor productivity, a rise in production of consumers' goods, and a reduction in production costs. It was, however, at the same time, a pure gain for the population.[9]

The relation of the annual price reductions to the budget was further taken into account in the 1953 and 1954 budget announcements. The Minister of Finance resorted to an extremely unusual accounting practice by including certain revenues and expenditures that might have been incurred if there had been no price reductions. An amount slightly smaller than the annual savings to the population from lower prices in the state stores was added to both revenues and expenditures.[10] The inclusion of these items in the budget announcements probably has little significance except as an attempt by the Soviet government to convince the populace that it is deeply interested in their welfare.

II. *Uses of the Price Reductions*

The annual price reductions have been fully exploited for propaganda purposes. One example of this is the Soviet claim that the decline in prices in the USSR shows the superiority of socialism over capitalism. The Soviet deflation from 1948 to 1954 contrasts sharply with the trend of prices during this period in many other countries. Even though inflation reveals nothing definite about real economic developments in capitalist countries, Soviet writers state that it reflects the increasing misery of the proletariat. They write:

> Whereas the Soviet Union is consistently following a policy of reducing prices and improving the material and cultural standards of the workers, in the capitalist countries the imperialists, embarking upon a wild arms race, are shifting the burden of ever-increasing military expenditure to the shoulders of the working people.

[8] For a discussion of whether price reductions ever result from the lowering of turnover taxes, see J. Robinson, "Theory and Practice of Planning," *Sov. Stud.*, July 1952, IV, 57, and M. Dobb, "A Note on Turnover Tax and Prices," *Sov. Stud.*, Jan. 1953, IV, 273-74.

[9] "Price Cuts," *Curr. Dig. Sov. Press*, Mar. 29, 1949, I, 43.

[10] For a discussion of this unusual change in the Soviet budget announcements, see A. Nove, "Soviet Budgets after Stalin," *Rev. Econ. Stat.*, Nov. 1954, XXXVI, 423.

Retail prices constantly rise in the capitalist world, public consumption is curtailed, and the impoverishment of the workers becomes catastrophically intensified.[11]

The Soviet government has used both percentage reductions in consumer prices and estimates in rubles of the annual savings to the population to show how the scale of living has risen. In the prewar period the Soviet leaders published data on increases in money wages for this purpose, but they did not give a cost-of-living or price index that would be needed to translate the money wage figures into real terms.

In 1954 the Minister of Finance announced that prices of consumer goods and foodstuffs were approximately 57 per cent below their level in 1947, the year before the first annual price cut.[12] The government has also estimated that the total reduction in prices for the four years from 1950 to 1954 was more than 25 per cent and was in four years slightly higher than the five-year goal of 23.5 per cent.[13] The return to prewar levels of production since the second world war has resulted in unusually large annual increases in the supply of consumer goods.[14] Because money wages have been relatively stable and shortages have probably not been made substantially larger by the price cuts, the percentage reductions in prices measure roughly the rise in real wages—particularly for urban workers who are significantly affected by prices in the trade network. It is interesting that Janet Chapman has estimated that from 1948 to 1952 real wages increased between 58 and 66 per cent, which is similar to the percentage reduction in prices announced in the Soviet press.[15]

The estimated annual savings to the population shown in Table I are usually announced at the same time the price cut decree is issued. These annual gains are believed to be the difference in the estimated annual retail sales at the old and the new prices. In 1948 the gain was based on the lowering of prices accompanying the monetary conversion in December 1947, the 1949 gain on the first two annual price reductions which were made in April 1948 and March 1949, and the gains for 1950 to 1954 on the price reductions announced in the spring of those years.

[11] "New Reduction of Retail Prices," *Curr. Dig. Sov. Press*, Apr. 14, 1951, III, 29, and Moskvin, *op. cit.*, p. 30.

[12] "Zverev's Report on the 1954 Budget," *Curr. Dig. Sov. Press*, June 16, 1954, VI, 19.

[13] "Speech by Deputy A. I. Mikoyan," *Curr. Dig. Sov. Press*, July 21, 1954, VI, 13.

[14] For estimates of the large increases in the output per capita of many basic consumer goods from 1948 to 1952, see Chapman, *op. cit.*, p. 148.

[15] *Ibid.*, p. 146. The variations in Janet Chapman's figures are dependent on (1) whether real wages are examined before or after taxes and bond purchases, and (2) whether 1928 or 1937 cost-of-living indexes are used.

TABLE I.—SAVINGS TO THE POPULATION FROM ANNUAL PRICE REDUCTIONS, 1948–1954*
(billions of rubles)

Year	In State Retail Trade	In Collective Farm Markets and Cooperative Trade	In State Retail Trade and Cooperative Trade[a]	In Collective Farm Markets	Total
1948	57	29			86
1949	48	23			71
1950	80	30			110
1951			27.5	7	34.5
1952			23	5	28
1953			46	7	53
1954			20	—[b]	20[c]

[a] Since 1951 the gains from trade in cooperative stores have been included with those from state retail trade rather than with those from the collective farm markets. The reason for this change is not known, but since cooperatives have had some degree of independence in setting prices, they have probably not fitted into either group perfectly. On the mechanism for determining prices charged by both consumer and industrial cooperatives, see N. Jasny, *The Soviet Price System* (Stanford, 1951), pp. 63–64.

[b] No amount specified.

[c] In August 1954, the prices of many fresh foods were raised. To offset the loss to the population from these price increases, prices of several foodstuffs were reduced starting in October 1954. It is not known what effect these midyear changes in prices would have on the total gains originally predicted for 1954. See "Decree on Seasonal Prices for Vegetables and Fruit," *Curr. Dig. Sov. Press*, Sept. 29, 1954, VI, 3–4.

* Sources: "Price Cuts," *Curr. Dig. Sov. Press*, Mar. 29, 1949, I, 43–44; "Price Cuts and the Gold Standard," *Curr. Dig. Sov. Press*, Apr. 15, 1950, II, 16; "New Reduction of Retail Prices," *Curr. Dig. Sov. Press*, Apr. 14, 1951, III, 29; "Zverev's Report on the 1954 Budget," *Curr. Dig. Sov. Press*, June 16, 1954, VI, 19; "Retail Price Cut Decree is Issued," *Curr. Dig. Sov. Press*, Apr. 25, 1953, V, 5.

The magnitude of successive price reductions in state and cooperative stores is large when compared with recent annual goals for state and cooperative trade. Total gains for 1951 to 1954, inclusive, amount to 116.5 billion rubles, which is 42 per cent of the 1950 planned goal of 275 billion rubles for state and cooperative trade.

Except in 1954 lower food prices in the collective farm markets have been listed as one of the results of the decrees.[16] In 1954 very small gains from lower prices in the collective farm markets were expected because reductions in food prices in state stores were extremely small during that year. Even though the government does not directly control collective farm prices, Soviet leaders have stated that price reductions in state retail outlets will "cause an identical drop in prices on the collective farm and cooperative market."[17] Collective farm prices have

[16] This presumption has caused Baykov to question the claimed gains to the population from price reductions. See A. Baykov, "Internal Trade During the War and Its Post-War Development," *Bull. Sov. Econ. Develop.*, Sept. 1950, Bull. 4, 8.

[17] "Price Cuts," *op. cit.*, p. 43.

probably fallen since the second world war because of the rapid recovery in the output of farm products. However, because state prices are already much lower than collective farm prices and shortages prevail in state stores, the relationship between state and free prices is probably the opposite of that which the government claims. Under such conditions state price cuts would tend to cause collective farm prices to rise. Lower prices in state retail outlets would tend to increase the amount of purchasing power that is left over to be spent in the free markets. Also, because some persons will want to increase their purchases when state prices are lowered, more buyers will be shifted to the free markets.

The price reduction decrees are also part of the continuous drive to stimulate the populace to greater effort. The Minister of Trade recently stated:

> No proof is needed of the fact that our state's efforts to improve the material status of the working class and the collective farm peasantry are being repaid one hundredfold to the socialist society. Labor productivity is increasing, cost of production is dropping, and the quantity of goods produced is growing and their quality is improving.
>
> Only in a socialist country does the working class realize and actually perceive that the higher labor productivity and the lower production costs, the more commodities there are for the working class, the lower prices are and the better the working class lives.[18]

After the price reductions, unions are directed to "explain exhaustively the importance of the new decrees to workers" and to "develop extensive socialist competition for fulfillment and overfulfillment of state plans by all enterprises . . . . for increased labor productivity and high-grade production techniques."[19] At this time industrial plants customarily make pledges to fulfill or overfulfill their plans.

III. *Price Cuts for Individual Items*

It is not clear what determines which items will be cut in price and what the magnitude of the individual price cuts will be. Joan Robinson believes that the annual price cuts are simply a means of increasing the general purchasing power of the population so that they will be able to buy the increased output of consumer goods. She has stated that when Soviet planners change prices they do not attempt to reach equilibrium through price adjustments for individual items. She writes:

> In general it is considered wrong in principle to use price as a means

[18] "Speech by Dep. A. I. Mikoyan," *op. cit.*, p. 13.

[19] "On Tasks of Trade Unions in Connection with Announcement of Price Reductions," *Curr. Dig. Sov. Press*, Apr. 14, 1951, III, 31.

of cutting demand to equality with supply in particular commodities. . . .

The overall cut in prices is intended to reflect the overall fall in cost of a range of commodities rather than that of each item taken separately.[20]

It is not known how Mrs. Robinson would explain the variations in price cuts among the items listed in Table II. These variations could reflect changes in the market conditions of different commodities. Price reductions for agricultural commodities have been relatively large, perhaps because of a change in the terms of trade between agricultural products and manufactured consumer goods.

Dobb says that conditions of supply are taken into consideration in making price changes. He writes:

It is hard to believe that the differences of price-cut have not been influenced, at least in part, by current differences in the supply position (price-cuts tending to be smaller in the case of things which were still in short supply).[21]

A recent Soviet article supports Dobb's point of view:

The price of individual products . . . deviates from the value. The practice of price-fixing involves the most diverse ratios of retail prices and unit costs.

It is perfectly clear that in determining prices the demand for various commodities cannot be disregarded. The Soviet state is doing everything necessary to fully satisfy the requirements of the population. But in the case of some items price must be used as an instrument to regulate consumption of these items until production reaches a point required for maximum satisfaction of the demand.

Fixing prices of goods without relation to the demand for them leads to a decreased rate of turnover of the goods. In some instances the setting of low prices fosters speculation in goods.[22]

Mrs. Robinson is correct in stressing the insensitivity of Soviet prices to changes in conditions of demand and supply over short periods. Table II shows that prices of many consumer goods have not been changed as often as once a year. Some items have been cut only once in seven years. In one of his essays on socialist calculation, Hayek pointed out that when prices of consumer goods are fixed by the government, the problem of how often prices should be revised presents a dilemma: if prices are changed frequently, the administrative costs of

[20] Robinson, *op. cit.*, p. 57.

[21] Dobb, *op. cit.*, p. 274.

[22] D. Krondrashev, "Price Fixing and Problems of Economic Planning," *Curr. Dig. Sov. Press*, June 6, 1953, V, 11.

changing prices will be high, but if prices are changed infrequently, the demand for many items will often be unequal to the supply.[23] Soviet planners have apparently chosen to avoid the high administrative costs of changing prices frequently and to accept conditions of market disequilibrium.

Prices of individual items have been set so low in most cases that the demand for them exceeds their supply, even though the output of consumer goods has been increasing rapidly and official rationing was given up in 1947. Although Lange thought that in a socialist system equilibrium prices that would avoid shortages and surpluses could be found by a process of trial and error, such a pricing system is not found in the USSR.[24] The Soviet press often mentions that items sell out rapidly when placed on sale in state stores. The following examples are typical:

> The board of the Central Union of Consumer Cooperatives is still permitting intolerable disruption of the supply of certain goods to the collective farm countryside. In many districts there are still total stoppages in the sale of such everyday articles as salt, kerosene, soap, matches, shag tobacco, etc.[25]

> Sales clerks in Kazan have to listen to customers' complaints that sometimes stores have no spring or summer clothing or footwear, no stock of athletic goods, etc. The editors of the newspaper . . . have received letters from collective farmers who are puzzled to find no pails, pans, washbasins and other domestic items on sale in the villages.[26]

> There is a great demand for children's ski suits with napping but they are placed on sale sporadically.

> Many parents wish to obtain baize shirts. They are cheap, have beautiful patterns and, what is most important, they are warm. However, these shirts appear rarely and in insignificant quantities.[27]

> In the summer of 1953 I tried to get a pair of women's dress shoes repaired. But the Kiev shops had no leather soles. "Sometimes we have them," said the shopkeepers, "but right now we don't. Come back in a week."[28]

[23] F. A. Hayek, "Socialist Calculation: The Competitive 'Solution'," *Economica*, May 1940, VII, 135-37; reprinted in *Individualism and the Economic Order* (Chicago, 1948), pp. 192-94.

[24] Lange also thought that there might be some advantages in having free markets for consumer goods in a socialist economic system. See O. Lange and F. M. Taylor, *On the Economic Theory of Socialism* (Minneapolis, 1938), pp. 90-98.

[25] "Central Union of Consumer Cooperatives Does Little to Meet Consumers' Growing Demands," *Curr. Dig. Sov. Press*, July 28, 1954, VI, 49.

[26] "More Consumers' Goods," *Curr. Dig. Sov. Press*, July 11, 1953, V, 33.

[27] "Clothes and Shoes for Children," *Curr. Dig. Sov. Press*, Jan. 27, 1954, V, 20.

[28] "Where Can One Have Shoes Repaired?" *Curr. Dig. Sov. Press*, Apr. 7, 1954, VI, 41.

TABLE II.—ANNOUNCED PERCENTAGE REDUCTIONS IN THE PRICES OF CONSUMER GOODS IN THE USSR, 1948–1954, SELECTED ITEMS OR GROUPS[*]

Item	1948	1949	1950	1951	1952	1953	1954
Food							
Meat and meat products		10	24–35	15	15–20	15	
Fish and fish products		10	10–35	10		10[a]	
Macaroni products		10	25	15	15	10	5
Rye bread		10	25.9	15	12	10	8
Coarse wheat and rye flour		10	25	15	15	10	5
Butter		10	30	15	15	10	
Margarine			35	10	15	10	
Lard			18	10	20	10	
Local cheeses		20	15	10	10	10	
Eggs			15	10	15	10	
Table salt		30	40	21	30	10–20	20
Rice			12	15	15	10	
Tea			10	10	20	20[a]	10
Coffee				10	15	20	15[a]
Granulated sugar			15		10	10	
Mayonnaise and other dressings			20		30	10	
Ice cream			20	10	15	10	
Jams and jellies			25		10	10	
Canned fruits		10	30		10	25	
Dried fruits and nuts			20		20	20	
Apples and pears			20		20	50	[b]
Tangerines and oranges			15			50	[b]
Potatoes			10			50	[b]
Beets			10			50	[b]
Cabbage and carrots			14.7			50	[b]
Apparel							
Coarse wool fabrics		10	24				
Cotton fabrics			15			15	15–20[a]
Pure wool fine fabrics		10	12			5	
Linen fabrics			15			8	
Part silk and artificial silk fabrics			12				
Overcoats, suits, dresses and other wool clothes		12	10–22				
Stockings and socks			15–25			20[a]	10–25
Caps (fabric)		15	25–35			10–15	10
Leather footwear			15			8–10	7[a]
Rubber footwear			10–15			10–15	12[a]

[a] Average reduction.

[b] In August 1954, the prices of potatoes, fruits, and vegetables were raised, but the percentage increases for individual items on an annual basis are not known.

[*] Sources: L. Björk, *Wages, Prices and Social Legislation in the Soviet Union* (London, 1953), p. 146; "Price Cuts," *Curr. Dig. Sov. Press*, March 29, 1949, I, 44; "Price Cuts and the Gold Standard," *Curr. Dig. Sov. Press*, April 15, 1950, II, 16–18; "On New Reduction of State Retail Prices on Foodstuffs and Manufactured Goods," *Curr. Dig. Sov. Press*, April 14, 1951, III, 29; "New Reduction of State Retail Prices of Foodstuffs," *Curr. Dig. Sov. Press*, May 10, 1952, IV, 31; "Retail Price Cut Decree is Issued," *Curr. Dig. Sov. Press*, April 25, 1953, V, 4; "New Reductions in State Retail Prices for Food and Manufactured Goods," *Curr. Dig. Sov. Press*, May 5, 1954, VI, 16.

TABLE II—(*continued*)

Item	1948	1949	1950	1951	1952	1953	1954
Household Goods							
Kitchen utensils			10–30			10	
Household soap			40	15		15	15[a]
Kerosene			10	22		25	38
Matches			25	20		17	20
Tumblers and other glass			15	10		10–20	10[a]
Hardware		20	20	10		10	10[a]
Electric irons		10	25			15	
Washing machines						20	10
Iron bedsteads			20	20			15
Tables, chairs, cupboards, divans and other furniture				20		5	
Medicines and other supplies						15[a]	15[a]
Vitamins	20		20		10	10	
Household chemical supplies						10	10[a]
Wool blankets			20				
Lace and curtain goods			30				
Radio sets	10	20	15	10			
Cameras	10	10	20				10[a]
Pianos		20	25				
Phonographs	20	30					
Hunting and fishing accessories						10–15	10[a]
Jewelry		20	15				10[a]
Wrist watches	12	30	20	10		5	
Perfume	10	20	15–25	10		10	10[a]
Fountain pens			30			20[a]	15
Celluloid toys			20			10	15[a]
Needles			20			20	20
Writing paper			10			10	10
Cigarettes	10		20	10		5–10	
Vodka	20	28	16.7	10		11	
Beer	20		30			15	
Axes, spades, scythes, and pitchforks				10		20	20
Gasoline				20		25	44.5
Mixed fodder		20	25	15	15	10	5[a]
Carts, wheels, and wagon supplies						10	
Tires and tubes for light autos and motorcycles						10	
Bicycles	20	20	20	10		10	
Lamps and metal lanterns						10	20
Building Materials							
Window glass			20	20		10	
Wallpaper			20	10		20	20
Paints			10–20			10	10[a]
Cement		30	20			25	20
Plywood							15
Linoleum						15	
Stove castings						10	

The continuous gap between state and free prices is additional evidence of shortages in the state outlets for foodstuffs. If official prices were set so that demand at these prices just balanced the supply in the state stores, prices in the collective farm markets would be equal to the official prices. Several newspaper correspondents have reported that state prices were much lower than free market prices.[29] In 1954, Clifton Daniel reported that prices in a farm market near Moscow were 5 times as high for cucumbers, 4 times as high for potatoes, 2½ times as high for apples, and the same for tomatoes as in state stores.[30] In addition, a recent Soviet article reveals that state prices are occasionally far below the less rigidly controlled prices charged by the the cooperatives. It gives as an example a bookcase priced at 579 rubles by the Furniture Industry Artel, but sold for 235 rubles in the state stores.[31]

The Soviet press occasionally mentions types of informal rationing—such as queues, illegal extra payments, or limits to the quantity sold to one person. Some type of formal or informal rationing is inevitable when prices are set below equilibrium levels. A recent letter to a Soviet newspaper states that people have to stand in line to buy an automobile in Moscow and describes the market for automobiles in the following way:

> Unfortunately my trip was fruitless. There were more people trying to buy automobiles in Moscow than there were cars in the stores.
>
> I must mention that certain shifty enterpreneurs offered to "help" me buy an automobile on condition that I pay 10,000 rubles more for a Pobeda than its price.[32]

Another article reveals that in the market for building materials there are restrictions on the amount sold per customer per day:

> Last year I laid the foundation for my house with great difficulty. This year I received a loan of 10,000 rubles for private construction. But for two months now my wife and I have gone to stores and lumberyards to buy cement, bricks, boards, lumber, and other materials. It was no use. . . . We were not able to get anything.
>
> The Ukraine Republic Ministry of Trade does not concern itself with such a category of customers as private builders. The only buyers recognized are those for whom norms of 20 kilograms of cement, one cubic meter of wood, etc., are set. In order to obtain enough materials to build a house I would have to go to the store 100 times for cement, ten

[29] See E. Stevens, *This is Russia—Uncensored* (New York, 1950), pp. 44-51, and H. E. Salisbury, "New Soviet Prices Vary with Season," *New York Times*, Aug. 15, 1954, p. 10.

[30] C. Daniel, "New Soviet Line Favoring Farms," *New York Times*, Sept. 7, 1954, p. 6.

[31] Krondrashev, *op. cit.*, pp. 10-11.

[32] "Concerning the Automobile Trade," *Curr. Dig. Sov. Press*, June 23, 1954, VI, 34.

times for roofing, 25 times for lumber, etc. But since these materials are seldom in the stores, one can imagine the private builders' position.[33]

An indication of the seriousness of the shortages is that twice during 1954 Soviet leaders have passed resolutions to alleviate them. At a meeting of the cooperative organizations in July, a decision was adopted to "eliminate the absolutely intolerable instances of interruptions in trade of goods in everyday demand. . . ."[34] An August decree establishing seasonal prices for farm produce attempted to "ensure greater uniformity in selling it during the course of the year."[35]

Soviet writers usually attribute market shortages to negligence of officials, "Bureaucratic methods in management of enterprises," lack of order in the distribution of goods, production of profitable items rather than those most desired by consumers, failure to follow regulations, or dishonesty. One of the rare admissions that shortages are related to the price reductions is contained in a recent speech by the Minister of Trade. However, he also repeated the belief that setting prices of consumer goods where demand is greater than supply has a stimulating effect on labor because shortages obviously show that supplies are not sufficient. Even before the second world war, Soviet writers defended the setting of prices below equilibrium levels in this way. The Minister of Trade said:

> The increased real wages of workers, the rise in the living standard of the rural population and the systematic reduction of prices have all occasioned a rise in demand for consumers' goods which has out-stripped production of certain items such as meat and animal fats. Some people even have the impression that there are fewer goods to be had now than there were several years ago.
>
> There is a simple way of giving the illusion that there are enough goods and that is not to cut prices further, i.e., to prevent any increase in the public's purchasing power, as is done in capitalist countries. Then everyone will think that there are enough goods—and there will be enough goods: surpluses may even accumulate. But this is a violation in principle of both Soviet policy and the fundamental interests of the people. . . . If we are to get the better of the goods shortage, there is only one correct way open to us—to speed up the rate of consumers' goods production. This is the way the Communist Party has chosen.[36]

[33] "Where Can a Private Builder Buy Building Materials?" *Curr. Dig. Sov. Press,* June 6, 1953, V, 39.

[34] "Resolution of the Fourth Congress of Representatives of USSR Consumers' Cooperatives," *Curr. Dig. Sov. Press,* Aug. 18, 1954, VI, 26.

[35] "Decree on Seasonal Prices for Vegetables and Fruit," *Curr. Dig. Sov. Press,* Sept. 29, 1954, VI, 3-4.

[36] "Election Campaign Speeches by Soviet Leaders—II," *Curr. Dig. Sov. Press,* Apr. 28, 1954, VI, 3.

Actually, it is doubtful whether a low-price policy involving market shortages will have the beneficial effect on labor productivity claimed by Soviet leaders. High prices would probably indicate the need for increasing output just as effectively as shortages. Also, the inconveniences resulting from market shortages make shopping difficult and discriminate against employed persons and especially working wives.

Although the 1954 decree establishing seasonal prices for potatoes, vegetables and fruit raised their prices, Soviet planners probably do not intend to adopt a policy of lessening market shortages by raising prices. The 1954 action followed the unusually large reduction of 50 per cent in the prices of these foodstuffs in 1953, and it is the only known decree in the past seven years that has raised the prices of consumer goods. After years of government prices set far below equilibrium levels, market shortages probably seem normal to Soviet price administrators, and the populace has become accustomed to them.

It is important that conditions of market disequilibrium have not existed in the collective farm markets. At the higher prices in these markets, foodstuffs are usually available and shopping is much easier than in state stores. By providing some markets where shortages do not exist, peasant markets may have contributed significantly to the workability of the Soviet distribution system. However, it is interesting that in spite of their usefulness, the peasant markets are expected to disappear as communism develops.

IV. *The Problem of Minimizing Inventories*

There is probably an important, but unpublicized, advantage in setting prices below equilibrium levels. Low prices avoid the possibility of surpluses and keep inventories and storage costs at a minimum. The Soviet government has admitted that it has inadequate storage facilities, and it has attempted to encourage collective farms and consumers to store more foodstuffs.[37] During the postwar period when output was expanding rapidly, prices would have had to be set especially low to avoid eventual surpluses before the next price cuts were decreed.

Although the Soviet pricing system results in very small inventories, Dobb believes that inventories are extremely important in the Soviet distribution system. He writes:

> There are two main ways in which short-period variations in the supply-demand position of particular commodities can be met. One (which our Western textbooks have prejudiced us to regard as the normal way) is to allow short-period prices to fluctuate in response to the current supply-

[37] See "Decree on Seasonal Prices," *op. cit.*, p. 3, and "Zverev on Financial Discipline and Control," *Curr. Dig. Sov. Press*, Aug. 30, 1952, IV, 4.

> demand relationship; and to regard a high ratio of short-period price to cost (or to some "normal value") as a *prima facie* reason for increasing supply in the ensuing plan-periods. The other is to keep prices (with some exceptions) in some fairly constant relationship to cost (or to "normal value") and to allow short-period variations in the supply-demand situation to result in varying rates of running-down of stocks (or even shop-shortages and queues). In this case priority for increased output in the next plan-period will presumably be assigned (other things being equal) to those commodities which show the quickest running-down of stocks or the longest queues. . . . The latter is a quite reasonable course to pursue, although it is not without its inconveniences for the consumer. In a period of rapid general improvement in the supply-position, however, such inconveniences may be regarded as relatively unimportant, and at any rate transitory.[38]

The "short-run economic problem" with which Dobb is concerned arises because within short periods, consumption frequently has to be adjusted and goods must be distributed with reference to an existing supply.[39] In a free enterprise system prices adjust consumption to production in the short run by rising when goods become scarce compared to demand and falling when they become abundant. As Dobb points out, these adjustments might also be performed by various forms of nonprice rationing such as queues. However, Dobb's suggestion that Soviet planners may be attempting to balance supply and demand in the short run by changes in inventory levels is very questionable. At present, Soviet prices appear to be set so low that retail inventories of many commodities do not exist much of the time. In order to have large enough inventories on hand to take care of short-run market fluctuations, prices would have to be so high that some merchandise would remain in stock even after demand at the official price had been completely satisfied. Such a system of distribution would undoubtedly require much larger storage facilities for consumer goods than exist in the Soviet economy at the present time.

Although the Soviet economy has had few surpluses resulting from setting prices above equilibrium levels, supplies of substandard goods or goods in unusual sizes have accumulated when official prices for them were too high. Because factories may fulfill their quotas by cutting quality or reducing variations in styles and sizes, goods that are difficult to sell at official prices are occasionally produced.[40] In 1953 there were large bargain sales to clear inventories of items that were unsalable at

[38] Dobb, *op. cit.*, p. 273.

[39] For a description of this fundamental economic problem, see F. H. Knight, *The Economic Organization* (Chicago, 1933), pp. 12-13, 78-82.

[40] See "The Consumer—Improve the Quality and Variety of Light Industry Products," *Curr. Dig. Sov. Press*, Feb. 8, 1949, I, 46.

official prices. In a recent speech the Minister of Trade described surplus conditions of this type:

> Whereas at the beginning of 1953 the trade network had a tremendous quantity of goods above plan left on hand, including unsalable goods of outmoded styles and of poor quality, in the year just ended the merchandise stocks left unsold above the established quotas have mainly been liquidated, while the quantity of unsalable merchandise has been substantially reduced.
>
> On the whole, surpluses in the trade network are now generally at a normal level.[41]

V. *Concluding Remarks*

Price reductions are probably superior to increases in money wages as a method of expanding consumption in a planned economy. The Soviet policy of inflation prior to the second world war had many disadvantages. Gerschenkron writes:

> There is no doubt that, in the past, inflation interfered considerably with efficient planning processes. It rendered difficult the ascertainment of relations between planned and actual cost of production in industry, and thus deprived the planners of their most important instrument for checking whether or not resources had been utilized in accordance with the plan. Furthermore, inflation provided the managers of industrial enterprises with a strong temptation to hoard raw materials, thus causing mal-allocations of resources within the economy, and further accentuating its character as a deficit economy and the disabilities and inefficiencies that flowed therefrom.[42]

The price reduction decrees are intended to be general welfare measures. Of course, price reductions in themselves would not make the Soviet people better off. Only increased availability of goods would do this. Also, farmers, who still comprise more than half the total labor force, have benefited much less than city workers. Because peasants are somewhat self-sufficient, they have benefited very little from the large cuts in state prices of foodstuffs. In addition, although employees' money incomes are stabilized, peasants' incomes fluctuate not only because they share in the variable output of the cooperative farms, but also because they still obtain a significant portion of their income from sales of farm produce in the free markets. Because of the dependence of the peasants on free market prices, the policy of stabilizing money incomes of employees, which causes free market prices to fall as farm output increases, tends to lower farm incomes. On the other hand,

[41] "Speech by Dep. A. I. Mikoyan," *op. cit.*, p. 12.

[42] Gerschenkron, *op. cit.*, pp. 30-31.

it is interesting that price reductions in state stores have probably tended to maintain peasant incomes because state price cuts tend to retard the decline of free market prices. In addition, perhaps to offset the unequal advantages to farm and city workers, in 1953-54 farm incomes were raised by special measures such as lowering compulsory delivery quotas, reducing agricultural taxes, and raising the procurement prices paid by the state for obligatory quotas.

INPUT-OUTPUT ANALYSIS AND ECONOMIC STRUCTURE

A Review Article

By LEONID HURWICZ*

It was only after having undertaken[1] the review of the present volume[2] that the writer became aware of the magnitude of the task, comparable to that of appraising, say, a year's contents of a thriving periodical. Even the book's length (541 pages, not counting indices and "fold-in" charts) fails to give adequate warning of its tremendous scope and wealth of material.

As indicated in the preface, the volume is a product of the first three years of the Harvard Economic Research Project set up with the help of a Rockefeller Foundation grant, partly financed by U. S. Air Forces funds, greatly helped by the cooperation of the Bureau of Labor Statistics, and, of course, founded on the earlier accomplishments of Leontief and his collaborators.

The first four of the volume's twelve chapters are by Leontief. The first three ("Introduction," "Structural Change," and "Dynamic Analysis") comprise Part I, entitled "Static and Dynamic Theory." The fourth ("Interregional Theory"), together with Walter Isard's paper ("Some Empirical Results and Problems of Regional Input-Output Analysis") constitute Part II. Part III consists of two papers dealing with capital structure: "The Structure of Capital" by Robert N. Grosse and "The Telephone Industry: A Study in Private Investment" by Paul G. Clark. Part IV, entitled "Explorations in the Use of Technological Data," contains "Process and Production Functions from Engineering Data" by Hollis B. Chenery, "Problems of Classification and Aggregation" by Mathilda Holzman, "The Technological Structure of the Cotton Textile Industry" by Anne P. Grosse, and "Commercial Air Transportation in the United States" by Allen R. Ferguson. Part V ("Consumption and Final Demand") consists of "The Role of Demand in the Economic Structure" by James S. Duesenberry and Helen Kistin.

A striking characteristic of the "product-mix" represented (in variable proportions!) in this volume is the interplay of empirical results, methodological discussion, and theoretical model construction. Thus Leontief's "Structural Change," located in a part "reserved" for theory, is largely devoted

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[1] Following the untimely death of the previously designated, and much more suitable, reviewer—Professor A. Henderson of the Carnegie Institute of Technology. The present reviewer profited from reading Henderson's multigraphed paper, dated June 30, 1953, entitled "The State of Input-Output Analysis."

[2] Wassily Leontief, and others, ***Studies in the Structure of the American Economy—Theoretical and Empirical Explorations in Input-Output Analysis.*** (New York: Oxford Univ. Press. 1953. Pp. x, 561. $11.00). Referred to as ***Studies*** in this article.

to the presentation and analysis of the empirical data on input-output coefficients in 1919, 1929, and 1939; at the same time, the paper has a mathematical appendix containing the derivation of certain algebraic relations relevant in analyzing the phenomena of structural change. Similarly, papers by Clark, Chenery, Holzman, Duesenberry and Kistin (the listing is not meant to be exhaustive!) are of considerable interest not only as empirical monographic studies, but also as contributions to methodology and economic theory.

Among the empirical studies, as can be seen from the titles, some are focused on one sector of the economy defined in terms of a commodity or industry; others cut across the whole economy, though with emphasis on a specific aspect (structural change, interregional structure, capital structure). Theoretical models largely correspond to the empirical materials handled, although not necessarily with the same scope or emphasis. Thus Leontief's dynamic theory goes much beyond the empirical use made of the available time series, while the theoretical basis underlying the computation of the inventory coefficients is rather played down.

Methodological problems arising in the treatment and interpretation of empirical data are discussed in almost every paper of the *Studies*. Some (as in the paper by Duesenberry and Kistin) are essentially in the domain of the theory of statistical inference. Some (*e.g.*, Holzman) deal with statistical decisions (unrelated to sampling issues) such as those of aggregation. Others (*e.g.*, Chenery) are concerned with the fitting of theoretical analysis together with the available statistical materials. Leontief himself raises a host of fundamental questions concerning the role of theory and empirical analysis in economics.

The detailed appraisal of each of the contributions in the *Studies* would take the reviewer far beyond the limits of his competence. It seems, therefore, preferable to follow up some of the issues common to most of the papers in the volume and try to answer (or at least formulate) some of the questions that are likely to be asked by an economist. This selection, unfortunately, is unfair to some of the contributors; let it be emphasized that it reflects not the reviewer's value judgment but his limitations.

I. *The Basic Model*

Leontief's basic static model, well known from his earlier writings and conveniently summarized at the beginning of Chapter 2, consists of two sets of relations: the balance equations and the structural equations. Each balance equation states that the total output of a given industry is absorbed either by itself or by other industries, or by the "outside" sector (*e.g.*, consumption). If the number of industries (apart from the "outside" sector) is m, the *balance equation* for the ith industry may be symbolically written as

$$X_i = x_{i1} + x_{i2} + \dots + x_{im} + y_i$$

where

X_i is the total output of the ith industry,

x_{ik} is the amount of product of the ith industry absorbed by the kth industry,

y_i is the amount of the product of the ith industry absorbed by the "outside" sector.

The listing of the amounts absorbed by the "outside" sector ($y_1, y_2 \ldots,$ y_m) is called the "bill of goods." The ratio of the amount of the ith industry's product absorbed by the kth industry to the output of the kth industry may be called the ith *technical coefficient* in the kth industry, and is denoted by a_{ik}. Thus, in terms of the notation just introduced, $a_{ik} = x_{ik}/X_k$; this relation, when solved for x_{ik} becomes

$$x_{ik} = a_{ik} \cdot X_k$$

and is called a *structural equation.*

In the present volume this scheme is extended to cover situations involving interregional ("intranational") and dynamic analysis.

For interregional purposes it is, in principle, sufficient to split each industry into as many regional subindustries as there are regions and then write out the balance and structural equations for each of the subindustries; a simplification results if the technical coefficients do not vary from region to region, and percentage distribution of each commodity's output among regions is given. (Some commodities are assumed only to travel within the region of production.)

For purposes of dynamic analysis, one takes into account the fact that some of the output of a given period goes into stocks (capital goods or inventories). The stocks are assumed parceled out among the m industries, although the possibility of the "outside" sector holding stocks is not ruled out. If S_{ik} denotes the stock of the ith commodity held by the kth industry and $\dot{S}_{ik}$ the increase[3] (positive, zero, or negative) in S_{ik} over the given period, the balance equation of the ith industry now becomes

$$X_i = x_{i1} + x_{i2} + \ldots + x_{im} + \dot{S}_{i1} + \dot{S}_{i2} + \ldots \dot{S}_{im} + y_i$$

which merely says that the output must be absorbed by some industry, either on current or capital account, or else be used by the "outside" sector.

The ratio of stock of the ith commodity used by the kth industry to the output of the kth industry may be called the ith *stock (capital) coefficient* in the kth industry, and is denoted by b_{ik}, so that $b_{ik} = S_{ik}/X_k$. The equivalent relation

$$S_{ik} = b_{ik} \cdot X_k$$

is referred to as a *structural stock-flow equation.*[4]

[3] More precisely, all entities are regarded as instantaneous rates. $\dot{S}_{ik}$ is then the time derivative of S_{ik}.

[4] If $\dot{X}_k$ denotes the (positive, zero, or negative) increase in output of the kth industry, the stock-flow equation (if regarded as invariant) implies the "pure acceleration" relation $\dot{S}_{ik} = b_{ik} \cdot \dot{X}_k$. Leontief's more sophisticated "multiphase" model, as well as the empirical work of R. N. Grosse and Clark, takes into account the irreversibility of the accumulation process. In Grosse's work $b_{ik} = S_{ik}/\overline{X}_k$ where $\overline{X}_k$ is the capacity (rather than current output) of the kth industry.

II. *The Constancy of the Structural Coefficients*

Ex post one can (in principle) always obtain the so-called *structural coefficients* (the a's and the b's) if the required data on output and stocks (the x_{ik} and the S_{ik}) are available.

That such knowledge is extremely useful, there is no doubt; Leontief and his collaborators would have deserved thanks from economists, theoretical and applied, if they had merely determined the historical values of these entities. But, as the term "structural" indicates, Leontief and his group think of the a's and b's as having a considerable amount of *invariance*. With some oversimplification, the nature of this invariance may be stated as follows: Suppose that the a's and the b's have been computed on the basis of a given year's data. Imagine now that the same year is to be "relived" by the nation, with a different bill of goods and a different set of outputs. Again, the a's and the b's are computed from the "relived" year's data. They would be the same as those originally obtained! Hence, in a static model, the output X_k and the interindustry flows x_{ik} can be obtained, given the bill of goods and the knowledge (based on, say, past observations) of the technical coefficients. Similarly, in a dynamic model, the time paths of stocks, outputs, and interindustry flows can be obtained, given the time paths of the bill-of-goods components together with the knowledge of the structural coefficients and of certain initial values. (The mathematical procedures involved in the solution are described in considerable detail in Chapter 3, but the situation would be further complicated by taking into account the fact that neither outputs nor stocks can be negative.)

The postulate of invariance of the structural coefficients does not mean that the a's and the b's must remain the same from year to year. Indeed, Chapter 2 is primarily devoted to a comparison of the values of the technical coefficients (a's) in 1919, 1929, and 1939, but these changes, called "structural," are interpreted in terms of technical progress and similar phenomena. Yet traditional economics does not require the hypothesis of technological change to account for the change of the input-output ratios! The usual classroom picture of a production function is not a straight line through the origin but a curve, often S-shaped, exhibiting in its various phases the phenomena of increasing, constant, as well as decreasing returns; the typical isoquant map allows for variations in the ratios of the different inputs to each other; similarly for joint outputs. Furthermore, the traditional theory of the firm depends on the nonlinearity phenomena.

Superficially, the situation is distressing. For it seems that there are two irreconcilable approaches in economics: one where everything is proportional and the coefficients fixed, the other where the absence of proportionality and coefficient fixity is the cornerstone of the theoretical structure. However, while it would be unrealistic to deny divergence of emphasis and specializing assumptions, one takes comfort in the fact that the developments of the last decade have resulted in a theoretical structure broad enough to accommodate both the traditional (curvilinear) and the fixed coefficient (linear homogeneous) models as special cases of a more general model, to be

here called the ***generalized activity model*** (which is an extension of "activity analysis" encompassing nonlinear, as well as linear, processes[5]). Among the situations covered by the generalized activity model are: the linear programming model (of which Leontief's input-output model may be considered a special case), and the traditional curvilinear model (as, say, in Allen or Hicks). The fundamental feature of the generalized activity model is that, unlike traditional economics, it goes beyond commodity amounts and looks at the processes (activities) which use up or produce these commodities. Given the levels (intensities) of all activities, the inputs and outputs are assumed to be uniquely determined, regardless of levels of the other activities. If one then assumes independence (additivity), the total net (positive, zero, or negative) output of a commodity is obtained by summing the outputs attributable to each of the activities. (If an activity level is zero, so is its output of every commodity.)[6]

Since the activity level determines both inputs and outputs, it can be eliminated to yield relationships between the inputs and the outputs. In linear programming it is assumed that every input and every output is proportional to the activity level, hence (for a given activity!) the input-output (as well as input-input and output-output) ratios are constant. But even in the linear programming models these ratios are different for different activities, hence may change from one period to another because of resource limitations, price considerations, etc. (In nonlinear models the ratios may, of course, change *within* a given activity.)

There are several indications that the contributors to the *Studies* do think of their models as embedded in such a generalized activity model. Leontief's remarks on pages 32-33 may be interpreted as describing "structural change" in terms of some activity levels going down to zero while others, previously zero, have become positive. Chenery's "process functions" are designed to describe the (not necessarily linear) relationships characterizing a single activity (process). Holzman's comments (pp. 343, 357-59) deal with nonlinearities and variations in the process-mix. Also, Leontief's more sophisticated dynamic model (pp. 68ff.) takes into account the variability of the

[5] Including the possibility of a continuum of processes.

[6] Where the number of activities is finite (say q) the model may be stated as follows: Denote the level of the pth activity by w_p and the total net (positive, zero, or negative) output (due to all processes) of the ith commodity by v_i. (The number of activities q may be larger than the number n of commodities. The list of commodities includes labor.) The fundamental technological relation for the ith commodity states that $v_i = f_i\ (w_1, w_2, \ldots, w_q)$, *i.e.*, that the choice of levels for all the activities uniquely determines the output of each commodity (the f_i are single-valued functions). When additivity is postulated, the total output may be split into parts attributable to the separate activities so that $v_i = v_i^1 + v_i^2 \ldots + v_i^q$ where v_i^p denotes the output attributable to the pth activity; in turn, $v_i^p = f_i^p\ (w_p)$, with $f_i^p\ (0) = 0$. The linear programming model is then obtained by requiring that $f_i^p\ (w_p) \equiv c_i^p w_p$ (with c_i^p constant), *i.e.*, that the ratios of outputs to activity levels be independent of those levels. The basic Leontief (open) input-output model is then obtained by requiring that $q = n - 1$ which (within the linear programming model) may be justified on grounds of efficiency. The "traditional" curvilinear models are analogous; they may be regarded as postulating a continuum of activities and nonlinear process relations f_i^p.

capital coefficients (the b's) depending on whether the output is rising or falling.

Yet a good deal of the exposition is based on the assumption of constancy of the structural coefficients. This does not matter when one is merely providing a historical description of a given year. But where policy recommendations or predictions are envisaged—and Leontief's section on "policy decisions and the open system" (pp. 65-68) shows this to be the case—the assumption that variations in the bill of goods (as distinct from technical progress, exhaustion of natural resources, changes in consumer tastes[7]) would leave the technical coefficients unchanged must be questioned.

The reviewer finds it genuinely difficult to determine in what spirit the assumption of coefficient constancy is being made.

Is it adopted primarily to simplify exposition and presentation of the data? This interpretation suggests itself very strongly in the light of remarks made (p. 94) in connection with a relation which is assumed to be one of proportionality although Leontief believes it to be linear nonhomogeneous (*i.e.*, nonproportional). The reason given for adopting the assumption under the circumstances is that "since . . . no reliable empirical measures . . . are yet available, no useful purpose can be served by incorporating them [*i.e.*, the nonproportionalities] in the present theoretical formulation." In effect Leontief seems to be saying the following: "In the xy plane I have one point through which my line (representing the relationship) must go; if I do not have another point, I might as well draw it through the origin, even though I know it probably, does not pass there." (Similarly, if only one point is given on a curve going through the origin, one might as well draw it as a straight line.) This may be quite acceptable as an expository device, but is obviously dangerous in situations where the policy (or predictive) implications would be different depending on whether a line through a given point does or does not go through the origin. In such a case, an arbitrary choice of the origin as the second point might create the incorrect impression that the available data are adequate for policy (or prediction) purposes.

There are, however, alternative interpretations of the constant coefficient assumption. Thus one might be quite willing to regard the assumption as a valid approximation for certain small displacements of the system. But what about the large displacements? Even if the linear programming model is assumed (so that the input-output ratios are constant for each activity), changes in the process-mix could be expected to bring about variations in the historically observed input-output ratios quite independently of technological progress. The "traditional" economist would naturally expect to observe these variations, especially if the price ratios (or the composition of the bill of goods) underwent a strong change. Yet it has been shown[8] that even with a

[7] See p. 20.

[8] See the following contributions in *Activity Analysis of Production and Allocation, Proceedings of a Conference,* edited by Tjalling C. Koopmans, Cowles Commission Monog. No. 13 (New York, 1951): Ch. 7, "Abstract of a Theorem Concerning the Substitutibility in Open Leontief Models," by Paul A. Samuelson; Ch. 8, "Alternative Proof of the Substitution Theorem for Leontief Models in the Case of Three Industries," by Tjalling C.

changing bill of goods all efficient production possibilities are characterized by the same input-output ratios, provided it is assumed that for the so-called basic activities constant returns prevail, there is no joint production, every activity requires the use of labor, and labor is the only primary input. While it is not difficult to construct examples involving the violation of these postulates, there may be important situations where the postulates are likely to be satisfied. Thus Leontief's empirical case is stronger than one might at first believe.

In any case there is little doubt that the constant-coefficient model is extremely convenient and should be used where applicable. On a priori grounds one would expect it to be close to reality in some situations,[9] wide off the mark in others. But if the data, embodying so much industry and ingenuity, are to be used for prediction or policy, the coefficient-constancy assumption must be examined in the light of the observed phenomena. Until this analysis has been carried out, those postulating constancy for purposes of prediction or policy rather than exposition are open to Leontief's criticism (Ch. 1) for letting the theory get too far ahead of the empirical knowledge.

III. *Technology versus Behavior*

In "traditional" economic models the knowledge of the bill of goods and of the technological relations does not suffice to predict the output levels of the different intermediate and primary commodities. To make such a prediction one must also know whether firms are maximizing profits (or following some other behavior principle) and, if so, what the price relationships are.

In a constant coefficient model, on the other hand, the bill of goods determines the output of each commodity in a unique fashion. Thus the constant coefficient approach seems to free us of the need for studying the complex problems of the firms' behavior patterns and market relationships. In fact, Leontief's remarks (p. 15) about the nonexistence of a discipline of economic psychology make one feel that he might regard it as unsound to have the behavior patterns brought into the picture.

Yet it is not easy to keep them out of the picture, especially when dynamic phenomena are being analyzed. The "irreversibility" of the accumulation process is a case in point. As Leontief points out (pp. 68ff.), while expansion in output (with capacity already fully utilized) may call for a proportionate increase in fixed capital, a decline in output would not result in a proportionate reduction in machinery and equipment. But this is not a purely technological phenomenon: with sufficiently pessimistic expectations and favorable scrap prices it might indeed pay to dismantle the plant.[10]

Koopmans; Ch. 9, "Alternative Proof of the Substitution Theorem for Leontief Models in the General Case," by Kenneth J. Arrow; Ch. 10, "Some Properties of a Generalized Leontief Model," by Nicholas Georgescu-Roegen. A generalized formulation, based on less restrictive postulates, is possible.

[9] See R. N. Grosse, p. 186, where theoretical arguments in favor of the capital-coefficient constancy are given.

[10] In discussing the possible indeterminacies and contradictions of the "multiphase" dynamic model Leontief hints (p. 75) at the "deeper layers of structural relationships,"

Clark's analysis of the determinants of investment in the telephone industry starts with the "pure acceleration" (proportionality) model, but then introduces such behavioral elements as "spare capacity," "irreversibility," and expectations of output. He recognizes (p. 250) that his modified model (the "capital requirements theory") is implicitly based on the profit maximization principle, and compares his model with a more "conventional," although unnecessarily crude, profit maximization approach. The crucial difference between the capital requirements theory and the "conventional" model described by Clark is that the former makes investment decisions insensitive to price ratios in general and to interest rates in particular. (There might, of course, be indirect sensitivity, since output expectations are not unrelated to the general condition of the market.) If, as Clark argues, the historical experience of the Bell System does indicate such insensitivity, the explanation is probably to be sought in the discrete nature of the capital variables and the presence of "corner optima." Thus Clark's model could (as he realizes) be fitted into a more sophisticated "conventional" model. An investigation of the problem from this viewpoint might be helpful in determining the class of situations in which the price insensitivity phenomena are likely to be observed.

The problem of price effects is also briefly considered by R. N. Grosse in his study of the structure of capital. He cites (p. 186) the switch from steam to Diesel power as an exceptional case where prices (in this case the coal miners' wage rate) did alter the capital coefficients and goes on to say: "But it is our view that exceptional cases of that sort do not occur frequently enough to destroy the usefulness of the fixed capital coefficient concept." In the reviewer's opinion, the preceding statement should be regarded as an empirical conjecture to be subjected to the usual procedures of verification. In the absence of systematic data on the subject everyone is entitled to follow his own hunch. The contributors to the *Studies* seem inclined to favor the hypothesis of price insensitivity. The reviewer, perhaps unduly impressed by the thinking and what Friedman has called the "casual empiricism" of many generations of economists, would expect to find price sensitivity in many important areas of the economic process.

Even those favoring the fixed coefficient hypothesis for capital equipment might hesitate with regard to inventories. R. N. Grosse states (p. 188) that "speculation may play a significant role in determining actual holdings"; hence, "they have been adjusted where possible to eliminate stocks exceeding what might be called the normal inventory stocks." For an input, these "normal" stocks are those said to be "required" by the users of the commodity and are assumed proportional to the user's level of output. Again, one might

but it is not clear whether these would be of a behavioral nature. With reference to a centrally guided system (*loc. cit.*), he does envisage the possibility of applying "certain maximizing rules." Incidentally, one wonders whether the contradictions would not disappear if the "anonymous" differential relations postulated by Leontief were replaced by difference equations (with arbitrarily short lags where desirable), each equation describing the behavior of a well-defined type of economic unit at time t, given the state of other variables at time $t-\tau$, $\tau>0$, and subject to technological restrictions and accounting identities. (If the relation system were complete, in the sense that the behavior of every type of unit was specified, one would also expect to avoid indeterminacies.)

expect that considerations of profitability, safety, and convenience would lead away from the simple proportionality idea with regard to inventories, just as was the case with regard to capital equipment in Clark's study of the telephone industry, but additional empirical work is needed to clarify this issue.

It would be surprising if economic analysis could be carried on successfully in ignorance of the principles guiding human behavior in connection with the decisions affecting production, construction of capital equipment, and the size of inventories.

IV. *Statistical Methodology*

The postulate of coefficient constancy, together with the related de-emphasis of behavioral aspects of the economic process leads to an attitude toward statistical procedures that, on the surface at least, differ greatly from that of other econometricians.

With considerable oversimplification, the reviewer sees input-output analysis as the process of "fitting" a one-parameter curve (a straight line through the origin) to a one-dot scatter diagram. If the curve to be "fitted" had two or more unknown parameters, no unique fit would be possible; in the jargon of recent theory, the relations would not be "estimable." Thus the formulation of a model where each relation has only one unknown parameter may be viewed as corresponding to the a priori identifying restrictions of the simultaneous equation models. Whether these (constant coefficient) a priori assumptions underlying Leontief's analysis are better founded or more realistic than those used in, say, Klein's models of the United States economy has not been established.

Now if a worker is unwilling to adopt the Leontief brand of simplifying restrictions, while still faced with one observation per (disaggregated) relation, he is forced to choose between a disaggregated but nonestimable model and one of the following two alternatives: a model which is made estimable at the (admittedly very serious) cost of considerable aggregation of variables, or any device which will yield more than one observation per relation. On the technological side, experimentation is, of course, the ideal answer and the volume's advocacy of engineering data is highly appropriate.[11] But where behavioral aspects of the structure are to be studied, experimentation is usually (though not always) ruled out and one is forced to resort to the examination of the history and time patterns of the relevant variables. Examples of this are to be found in Clark's (informal) test of the null hypothesis that prices and interest rates do not influence investment decisions, as well as in the Duesenberry-Kistin investigation of the demand function for certain consumer goods. Indeed how could one appraise the effects of price variations except by comparing different situations (not always obtainable at any one time point) in which different prices prevailed? The reviewer finds it, therefore, difficult to agree with the implications of Leontief's highly picturesque diagnosis (p. 7): ". . . in their desperate search for sufficiently large 'samples,' the

[11] Interestingly enough, when these data are used as is the case in the papers by Chenery and Anne P. Grosse (*cf.* pp. 373-74), the emphasis on constant proportions largely disappears.

proponents of indirect statistical inference found themselves driven toward the treacherous shoals of time-series analysis." The analysis of time series does indeed present special and serious difficulties, but these cannot be avoided except at the cost of neglecting the study of behavioral aspects of the economic structure and even certain purely technological phenomena.

Similarly, except for classroom purposes, the use of models more highly aggregated than those dealt with in the *Studies* is not a matter of a methodological predilection (as seems to be surmised by Leontief on page 6), but rather an unavoidable choice dictated in certain situations by the limitations of the data available (including even the highly disaggregated input-output figures) in relation to the number of parameters to be estimated.

Most workers in this field could probably agree on the ideal of having data which are highly disaggregated (as to commodities and processes), split by decision units ("cross-section"), and available for a sizable time period. But in the meantime one is forced to use data deficient in at least some of these respects. Economics is too poor to be able to discard any source of information, be it aggregated time series or disaggregated one-time-point observations, despite their admitted weaknesss.

One natural consequence of the use of one-observation samples is that sampling variation and error cannot be estimated. Hence the emphasis (and impressive sophistication) with regard to possible biases due to alternative classification and disaggregation methods (*e.g.*, Holzman), but little about the probabilistic aspects of the problem. An outstanding exception is, however, found in the Duesenberry-Kistin study[12] of demand for consumer goods. Here the non-observable stochastic component is explicitly introduced into the demand relations and the problems of bias due to possible correlation between the disturbance and the "independent" variables, as well as that of error in the "independent" variables, are openly faced. The issue is, of course, identical with that of the "single equation approach" bias discussed in the literature of the simultaneous systems. (It should be made clear that many other sources of estimation bias are also considered.) The demand study shows remarkable ingenuity in eliminating some of the sources of variation and the utilization of available data. Its findings (that demand elasticity for food is higher than estimated by Girshick and Haavelmo and that the hypothesis of "mysterious and arbitrary changes in taste" is not needed to explain the observations) are interesting and very important. Yet the authors are afraid (p. 477) that "it may be said that what we have done is to find the errors and then explain them away by postulating shifts in demand," though they defend themselves against such a charge. In the reviewer's opinion, there is only one way of avoiding this type of difficulty. Regardless of the path of discovery, the final results must be presented in the following conditional form: "If one adopts the class of a priori admissible hypotheses[13] (here the underlying assumptions are completely specified), the following are the (best unbiased, maximum likelihood, or whatever is applicable) estimates of (say) the elasticity coefficients based on

[12] Which is not of the one-observation type.

[13] *I.e.*, the statistician's large omega, representing assumptions which, in a given context, are regarded as firmly accepted rather than subject to testing.

such and such data." The validity of such a statement is independent of the authors' state of mind and may be accepted or rejected by readers depending on their attitude toward the specification, estimation principle, or the reliability of the data.

The type of analysis represented by the *Studies* is of tremendous value and importance to the development of the science of economics and it is only natural that there should be controversy concerning certain aspects of its methodology and the domain of its applicability. It is important that this work be continued and that its relationship to other streams of thought in contemporary economics and econometrics be intensively explored. In the reviewer's opinion, such an exploration will typically reveal complementarity rather than substitutability.

LÖSCH ON LOCATION

A Review Article

By Stefan Valavanis*

The Economics of Location[1] belongs to that class of works, of which each generation produces very few, that both introduce a new subject and exhaust it. As with the *Theory of Games,* or Keynes' *General Theory,* the main ideas are few and appear utterly simple once popularized. They are *fortunate* ideas; that is, they have many consequences that matter and that are not obvious.

My task is to sift and present simply Lösch's key ideas and results, to point out which of them have and which have not analogues elsewhere in economics, and to show which areas of economics are affected by his contribution.

Even if the earth's surface were perfectly homogeneous, it would become differentiated into farms, cities and roads for purely economic reasons. Economic activities would arrange themselves into honeycombs of regular hexagons. Regions would emerge with characteristic prices and wages, and would trade their characteristic products.

The purely economic reasons for spatial differentiation in the absence of historical or geographical accidents are three: economies of scale, transport costs and agriculture's need for space. With economies of scale and no transport costs whatever, all production would be concentrated in one, or a few, optimum-sized plants located at random. With transport costs and no economies of scale, a little of every product would be produced on every square inch of the earth's surface. With both economies of scale and transport costs, the result is intermediate: several production sites at definite distances compromise between mass production and freight costs. This is what happens if space as such is not an ingredient of production, as is approximately true in industry. In agriculture, however, acreage itself is an input. This fact alone, if there were no economies of scale or transport costs, would squeeze nonagricultural production into small sites.

Unquestionably, spatial differentiation will develop. What will it look like?

Price funnels and demand cones. Let population be equally dense everywhere and let all people have like tastes. If *d,* in Figure 1, is an individual demand curve for beer, and *OP* is the price at the brewery, which is at *P,*

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[1] August Lösch, ***The Economics of Location,*** translated from the second revised edition by William H. Woglom with the assistance of Wolfgang F. Stolper (New Haven: Yale University Press, 1954). The German title is ***Die räumliche Ordnung der Wirtschaft; eine Untersuchung über Standort, Wirtschaftsgebiete und internationalen Handel*** (Jena: Fischer, 1943). The Yale University Press has kindly given permission for the reproduction of Figures 20 (p. 106), 26 (p. 117), 28 and 29 (p. 125), and Table 7 (p. 119) in the book, which here appear as Figures 1, 5, 7 and 8, and Table I. Figure 2 is adapted from Figure 21 (p. 106) in the book.

those living there will buy *PQ* bottles of beer. Farther away the price is higher by the amount of the freight, and the quantity demanded consequently smaller. At *F* no beer can be sold at all. Total sales are equal to the volume of the cone produced by rotating triangle *PQF* (Figure 1) around *PQ*. The brewery is surrounded by a *demand cone* (Figure 2) and by a *price funnel* (Figure 3) which is steeper the higher the freight per mile. The brewery's *sales area* is a circle of radius ρ. Likewise, its *supply areas* of barley, hops, and labor are circles of various sizes around *P*.

As long as profits are made, new breweries are established. Competition squeezes together the round sales areas into equal regular hexagons until both brewery profits and beerless areas have disappeared. Of all regular patterns

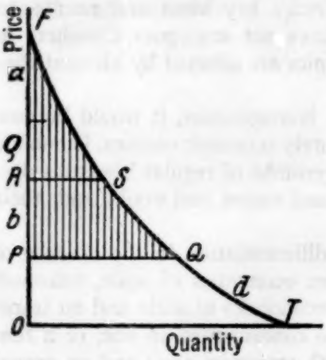

FIG. 1 DEMAND

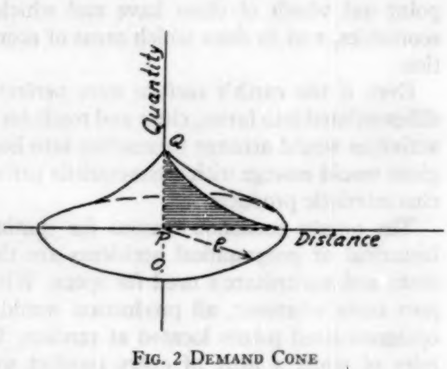

FIG. 2 DEMAND CONE

that can fill up the space, the honeycomb of hexagons minimizes total transport costs. This is true for every commodity. On the other hand, the size of the hexagons depends solely on the individual demand for beer, and on freights for beer and its raw materials.

This proves too much. If the criterion is minimum transport costs, why are they not eliminated altogether by people living right at the breweries? It is true that the optimum distance between breweries may not be optimum for bakeries or laundries, so that some transport costs would persist. However a best average distance could be found and people would group together in equally spaced identical settlements, each having a brewery, bakery and laundry.

Duality between agriculture and industry. Now we appreciate the full force of Lösch's distinction between agriculture and industry. Agricultural production is areal, industrial production is punctiform. The best location for the consumption of industrial goods is the city, whereas the best one for consumption of food implies an even distribution of the people. As long as products of the soil are an important item of demand, population will be scattered, if not continuously at least evenly, like polka dots, over the land.

Punctiform industry selling to areally spaced customers is characterized by *price funnels*. Conversely, areal agriculture selling to a punctiform city

is characterized by *crop gradients*—the continuous counterpart of Thünen's rings. This easy result, based on the duality between agriculture and industry, illustrates again Lösch's Midas touch.

Discontinuous settlement. There are two reasons why population should be scattered like sparse polka dots: (1) It is the best compromise between proximity to food and proximity to industrial production. (2) It is best for certain aspects of agricultural production. Shelter for cattle, the farm house,

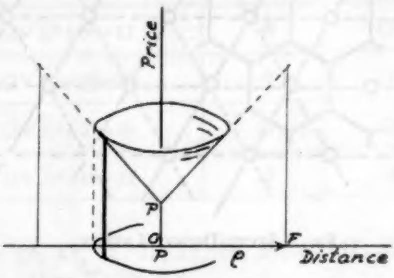

FIG. 3 PRICE FUNNEL

the well, are not areal but punctiform, and some farm operations resemble those of the brewery. Hexagonal farms are best.[2] Farm houses will then be laid out on a 60-degree lattice (Figure 4).

Market sizes. Discontinuous settlement restricts the possible market sizes. If I publish a rural newspaper, I do not care how far from the printer's is the nearest or the remotest corner of my subscribers' farms, because the newsboy has to deliver to the house.[3] If a circulation of 7 copies is economical each newspaper serves an area like Figure 5. If a circulation of 9 is indispensable, my sales area (Figure 6) will include the seven original customers at N, H_1 to H_6 plus one-third of the six farms J_1 to J_6 of the next ring. The other two-thirds read rival newspapers like N_1. Circulation of 7½, 8, or 8½ and a hexagon intermediate between Figure 5 and Figure 6 is impossible, not because of discontinuity in the number of copies that can be produced, but because of discontinuity in the number of customers that can be found for them.[4]

Now a few definitions, yielding a jackpot of results:

n the number of *equivalent customers*. If a customer, like J_3, is on a boundary, he is divided up equally by the number of suppliers on whose areas he verges. In Figure 6, each J-customer is divided by 3. The J's then add up to 2 equivalent customers for supplier N, who has altogether 9 equivalent customers.

[2] Lösch's treatment here is incomplete. See page 115, note 12.

[3] Or the mailbox, which is also on a 60-degree lattice of mailboxes.

[4] Lösch does not notice that the tendency toward discontinuity of area sizes is helped from the input side. A brewery gets its barley and hops from barns at $H_1, \ldots H_6$ and not from all over the farm. Barley grown at A (Figure 6) goes to N_2, while barley grown at B (which is farther than A) goes to N.

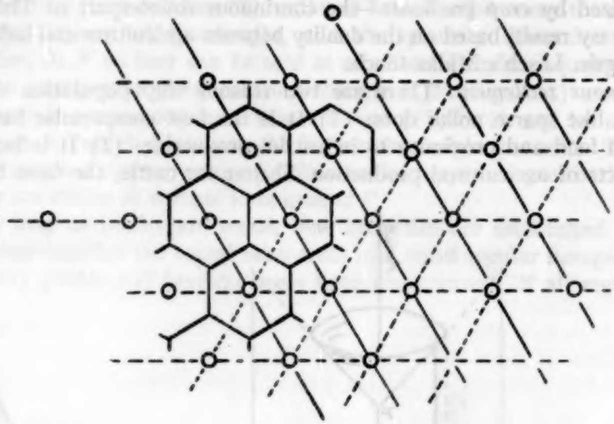

FIG. 4 SIXTY-DEGREE LATTICE

b the distance between towns that produce rival products.

a the distance between original settlements.

Results:

(1) $b = a\sqrt{n}$; that is, the distance between two like enterprises is proportional to the square root of the number of equivalent customers.

(2) The size of a market area is always $a^2 n\sqrt{3}/2$.

(3) The number of equivalent customers increases by jumps according to the law

$$(3.1)\quad n = (k\sqrt{3})^2 + j^2$$

$$(3.2)\quad n = [(k + \tfrac{1}{2})\sqrt{3})]^2 + (j + \tfrac{1}{2})^2$$

where j runs the integers from 0 to k first according to (3.1) and then according to (3.2), and where k runs the integers from 1 to infinity. Thus the seventeen smallest market areas have 3, 4, 7,

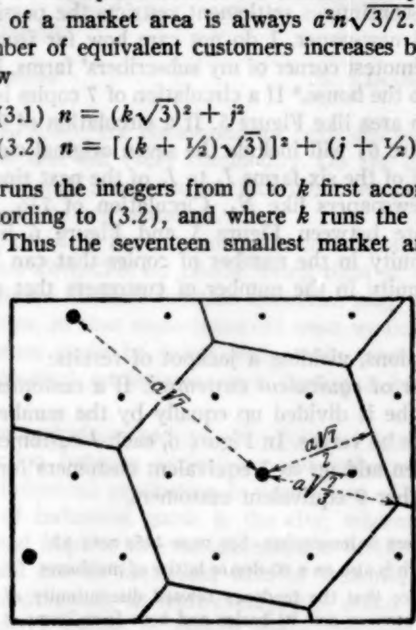

FIG. 5 MARKET AREA $n = 7$

TABLE I.—THE FIFTEEN SMALLEST MARKET SIZES

Area No.	n	Area No.	n
1	$(1\sqrt{3})^2+0^2=3$	3	$(1\frac{1}{2}\sqrt{3})^2+(\frac{1}{2})^2=7$
2	$(1\sqrt{3})^2+1^2=4$	4	$(1\frac{1}{2}\sqrt{3})^2+(1\frac{1}{2})^2=9$
5	$(2\sqrt{3})^2+0^2=12$	8	$(2\frac{1}{2}\sqrt{3})^2+(\frac{1}{2})^2=19$
6	$(2\sqrt{3})^2+1^2=13$	9	$(2\frac{1}{2}\sqrt{3})^2+(1\frac{1}{2})^2=21$
7	$(2\sqrt{3})^2+2^2=16$	10	$(2\frac{1}{2}\sqrt{3})^2+(2\frac{1}{2})^2=25$
11	$(3\sqrt{3})^2+0^2=27$	15	$(3\frac{1}{2}\sqrt{3})^2+(\frac{1}{2})^2=37$

9, 12, 13, 16, 19, 21, 25, 27, 28, 31, 36, 37, 39, and 43 equivalent customers. (See Table I.)

Systems of networks. With uniformly distributed population (continuous or not) each industry has its characteristic size of hexagon and divides space with a honeycomb of such hexagons. Now if two or more honeycomb-shaped nets are thrown on a table at random, thread-density is neither uniform nor random. There are local bunchings of thread, and because of the regularity of the several nets, equally complex bunchings form logical patterns on the table. The same is true of the hexagons' centers. They bunch into regular patterns. Now and then in a small neighborhood we find both a brewery and a bakery, or both a bakery and a laundry. More rarely a neighborhood con-

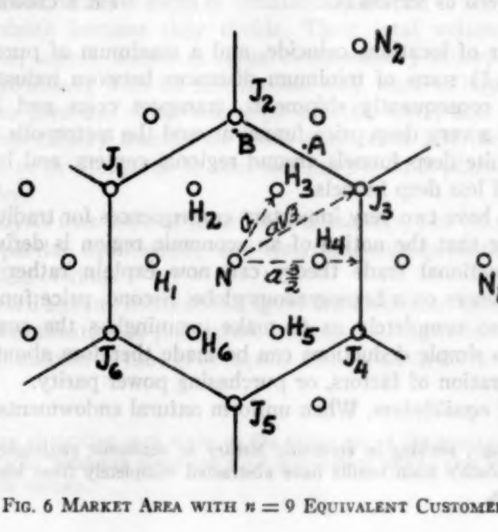

FIG. 6 MARKET AREA WITH $n = 9$ EQUIVALENT CUSTOMERS

tains all three industries. Industrial centers, in other words, emerge in spite of continuous and uniform population.

Now suppose that hexagon nets randomly thrown together are no longer of continuously varying diameters, but come in a few assorted sizes. Bunchings and patterns of bunchings become more likely, because now the few assorted diameters have lowest common multiples, which was not true before. When farm houses are laid out as in Figure 4, the tendency for industrial concentration, low prices, high wages, and much commuting is intensified.

Urban cogwheels. We now lay honeycomb nets of the possible sizes together so that they have at least one point, the metropolis, in common (Figure 7). We rotate the nets so as to get a cogwheel pattern of six sectors with few and six with many production sites (Figure 8). With this arrangement (1) the

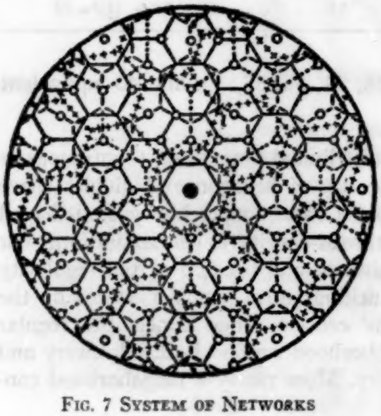

FIG. 7 SYSTEM OF NETWORKS

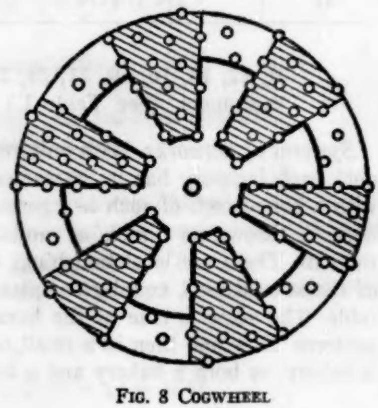

FIG. 8 COGWHEEL

greatest number of locations coincide, and a maximum of purchases can be made locally, (2) sums of minimum distances between industrial locations are least, and consequently shipments, transport costs and highways are minimized, (3) a very deep price funnel around the metropolis is surrounded by a ring of quite deep funnels around regional centers, and in between are rings of rings of less deep funnels.

These results have two very important consequences for traditional theory.[5] First, it is clear that the notion of an economic region is derivable and not primary. International trade theory can now explain rather than assume local cost differences on a homogeneous globe. Second, price funnels break up the landscape so completely as to make meaningless the concept of local price levels; no simple deductions can be made therefore about comparative advantage, migration of factors, or purchasing power parity.

Interregional equilibrium. When uniform natural endowments are assumed,

[5] Strangely enough, nothing in economic history or economic geography is invalidated. This is because Lösch's main results have abstracted completely from historical and geographical accidents.

men, goods, and places are mutually determined. Every worker carries with him his individual demands. Every good requires certain inputs and a market area of a certain size. Every location, by its prices and rents, attracts or repels industries and dictates to men how they will spend their incomes.

Other things being equal, the following questions can be answered, one at a time, by means of marginal analysis: (1) What does a given person produce? (2) Who works at the production of a given good? (3) Where does a given person reside? (4) Who lives in a certain locality? (5) What does a given locality produce? (6) Where is a given good produced? That all six answers can be determined simultaneously is no surprise to the economist. Demands, freight costs, balance equations and marginal conditions are just enough to determine a solution.

How is this equilibrium restored if disturbed? In the short run, prices change and goods are transferred. Long-run disturbances lead to change of jobs or migration of industries. In fact all six relations play a part according to their price, time and space elasticities.

Price waves. Lösch devotes much space[6] to short-run disturbances and the transfer problem. I summarize this here only to present one last main idea, that of price waves.

Suppose a foreign firm suddenly orders from Paris 1,000 marks' worth of shoes instead of buying them, as it had formerly, in Berlin. In Paris, the price of shoes will rise; their market area will shrink but hides and nails will have to be bought farther afield. Workers will be attracted from other industries, and rents will rise. Neighboring shoe factories faced with shortage of materials and labor will raise the price of their shoes and bid up hides in their own supply areas. Paris will become the focus of inflationary price waves that ever expand in area, but ever diminish in intensity. This is so because the impact is divided among more and more establishments and other kinds of goods. Berlin would be the focus of deflationary waves.

Waves diminish because they divide. Their total volume, however, remains constant, unless, sooner or later, *compensatory absorption* occurs. To illustrate, Luxembourg with its new income may want to buy precisely what Leipzig had to give up.[7] This will wipe out the wave, not just divide and divert it. Compensatory transfer of goods may occur anywhere, in the Saar, on the Rhine, or in Mongolia. It does not have to take place on the Franco-German border.

Lösch's analysis uses tools of traditional economics, like maximization, pure competition, partial equilibrium, and simultaneous equilibrium. Conceptual analogies are less obvious.

The downward sloping demand of Figure 1 is analogous to that of imperfect competition. Localization of production corresponds to product differentiation. Space is to agriculture as time is to capital theory, an essential new ingredient.

[6] Pages 265-304.

[7] Compensatory absorption may occur on the major arc of the great circle through Paris and Berlin, say with Bordeaux absorbing what Königsberg had to give up, or it may occur off the great circle entirely.

As the Walrasian system determines relative and not absolute prices, so in Lösch the metropolis itself can be anywhere. The flattening of price waves is deceptively like the dying out of the multiplier. Compensatory transfer is a little like the Pigou effect.

Ideas with no analogues in ordinary economics, like the discontinuity of hexagon sizes (Table I), and the rotation of hexagonal networks (Figure 8) I find very rare. The persistence of rent differences in spite of homogeneous endowments is *not* due to any novel assumption.

That familiar concepts should generate startling results more than any other thing attests to the genius of August Lösch.

COMMUNICATIONS

On Underwriting Consumption and Employment

The purpose of this note is to amplify one aspect of my earlier proposal for underwriting full employment in the United States[1]—the part having to do with techniques for boosting consumption when it would otherwise fall short of the target. It is probable that the subject of full employment will claim the spotlight again when and if the world situation permits major reductions in armament expenditures, and it is at least possible that a policy of assured full employment in this country, if we had such a policy now, would help to hasten that day.

The question of feasibility depends, I have argued, on whether or not aggregate consumer spending is underwritten in addition to aggregate employment as such. Without that feature, a policy of guaranteed full employment could involve the government is so large a degree of direct responsibility for the creation of jobs—such as expansion of public works, and perhaps wholesale subsidies to, and/or control over, private production—as to compromise the essentials of our private-enterprise system. Because of that risk, such a policy (as contrasted with contracyclical policy in a more limited sense) is not likely to be voted in the United States in the foreseeable future. That risk disappears if aggregate consumer spending, too, is underwritten and maintained at a proper level, one high enough to keep reliance on supplementary public works within reasonable bounds.[2] The risk of an unbalanced

[1] See my "The Underwriting Approach to Full Employment: A Further Explanation," *Rev. Econ. Stat.*, Aug. 1949, XXXI, 182-92. Also my "The Underwriting of Aggregate Consumer Spending as a Pillar of Full-Employment Policy," *Am. Econ. Rev.*, Mar. 1944, XXXIV, 21-55; other papers collected in *Full Employment and Free Enterprise* (Washington, 1947); and "Employment the Key," *Christian Science Monitor,* July 23, 1949, mag. sec., pp. 2, 12.

[2] See "The Underwriting Approach . . . ," *op. cit.*, pp. 184-85, for my theory of the "correct" level of aggregate consumer spending. Briefly, (1), estimated full-employment GNP, minus (2), the sum of (2a) expected government purchases of goods and services, including all public works approved "for their own sake," (2b) expected gross private domestic investment (probably, as a general rule, the anticipated cyclical-average level), and (2c) expected net foreign investment, equals (3) the level at which personal consumption expenditures should be underwritten. Thus one may advocate, as I personally do, rather generous regular appropriations for public works, but the amount included in (2a), and hence reflected in (3), depends on the will of Congress. A foreign-trade balance, plus or minus, similarly affects, and is accommodated in, (3) because it registers in (2c) and, where due to foreign aid, etc., in (2a). Actually my proposal calls for setting, not a single target figure for aggregate personal consumption, but a range between a guaranteed floor and a guaranteed ceiling, the leeway allowed being possibly of the order of 2 per cent. A summary statement on how minimum and maximum levels both of aggregate consumption and of aggregate employment would be likely to be established and administered in practice, *i.e.*, the respective roles of Congress and the Executive and the requisite amendments to the Employment Act of 1946, appears in "Employment the Key," *op. cit.;* see also *Full Employment and Free Enterprise, op. cit.*, pp. 163-70.

budget remains, but this—a corollary of the danger of oversaving itself—is not, as the other risk is, one that our system of private enterprise cannot bear.

I have elsewhere suggested a number of alternative procedures for enlarging consumers' incomes directly when personal consumption expenditures would otherwise—even at a full-employment level of income payments—fall below the underwritten level.[3] For some time I was inclined to stress tax reductions or offsets. Here I wish to bring into consideration a different method, involving the use of what might be called Consumer Sales Premiums (CSP for short). This method would provide not only additional purchasing power but an actual inducement to spend. Where an income-tax rebate, for example, would not favor consumer spending relative to consumer saving, but rather would tend to raise the level of both, CSP would be distributed only in connection with consumer spending as such and hence would establish a direct incentive to spend more, both out of normal income and out of the premiums when cashed. Thus the target level of consumer spending would be reached at smaller cost to the government.

Certain other general characteristics of the CSP method may also be briefly noted here. It would not noticeably reduce anyone's incentive to work—a charge sometimes loosely leveled against consumer transfer payment schemes in general but actually valid in special cases only. It would be perfectly flexible as to the amount of "lift" to consumer income it could provide. And it would be reversible into a special sales tax,[4] with a minimum of difficulty or misunderstanding, in the event the problem shifted to one of avoiding an inflationary rise of consumer spending above its guaranteed ceiling.

CSP would take the form of small coupons or stamps, in convenient denominations, which would be used as follows: (1) The Treasury would distribute them to banks and designated post offices throughout the country. (2) Banks and post offices would pass them along, when authorized by the responsible agency in Washington, to "retailers"—stores, service establishments, independent professional practitioners such as doctors—in ratio to their certified

[3] See "The Underwriting Approach . . . ," *op. cit.*, pp. 187-88. It is important to note that such measures—indeed, all *compensatory* measures under this plan, whether they be (a) such measures, taken in relation to current rates of consumer spending, to expand or contract consumer income directly, or (b) measures, taken in relation to current levels of employment, to expand or contract public works (and, incidentally, hold income payments at the full-employment level)—are viewed as *supplementing and in no sense substituting for basic or long-run policies*, a primary function of which is to make compensatory measures less necessary. The more that basic fiscal and other measures (high wages, a tax system that is progressive but encourages risk-taking, prevention of abuses of monopoly power, etc.) can do to strengthen production incentives and broaden the distribution of purchasing power, the better.

[4] I am opposed to giving sales taxes, with their regressive character, any disproportionate emphasis in our tax system. However, if a special sales tax were linked with CSP in a two-way compensatory mechanism of the type here considered, the usual objection need hardly apply. The effect would be as progressive during periods when it was necessary to boost purchasing power as it would be regressive when necessary to hold purchasing power down; or more so, assuming sales tax exemptions for necessities.

current volume of consumer business.[5] (3) During periods declared to be "pay out" periods, retailers would give them to individual consumers as premiums on their purchases (value of purchase, times authorized percentage, figured to the nearest penny). (4) The individual consumer would redeem his CSP for cash at his bank or post office before the expiration date marked on the stamp's face. (5) Banks and the U.S. Post Office Department would return the CSP in bulk lots to the Treasury and would receive face value plus suitable compensation for their services as agents.

The administrative problems connected with such a scheme do not appear unduly formidable. The burden on retailers would be roughly like that of a sales tax—slightly more for bills mailed, since these upon payment would require a return receipt transmitting CSP. While there might be a number of CSP agents in a community, each retailer would normally have to choose one source of supply, and all lists of applicants would be cross-checked to prevent duplication. Each consumer would likewise normally deal with a single bank or post office selected by him. As a convenience and further precaution he probably would have a blank book issued to him, identified as his, to the pages of which his CSP would have to be affixed to be eligible for redemption in cash.

A numerical example will illustrate the effect on the economy as a whole. Assume aggregate consumer spending in year X underwritten at \$300 billion, with the top limit set at \$306 billion. Ignoring here the seasonal factor in sales, at least \$75 billion should then be spent each quarter, or \$25 billion each month. Assume that, after six weeks, the preliminary forecast for the first quarter showed only \$72 billion. The responsible agency might then authorize CSP to be issued on all retail sales at a 10 per cent rate during months 3, 4 and 5. If monthly rates of consumer spending rose from \$24 billion in months 1 and 2 to \$27.3 billion in months 3, 4 and 5 (let us suppose that the inducement of obtaining CSP raised "ordinary" spending to \$25 billion; add \$2.5 billion CSP converted to cash less \$200 million of extra saving from this extra cash), this would bring the five-month total to \$129.9 billion, as against a target minimum of \$125 billion, and the responsible agency might order termination of CSP payments at that point. The premiums might have to be issued again, at the same or a different percentage rate, later in the year. Or, if conditions changed markedly and total consumer spending for the year threatened to exceed the \$306 billion limit, the responsible agency would bring into play the special sales tax or other agreed device for curbing a spending excess.

John H. G. Pierson*

[5] Purchases for business account would sometimes masquerade as consumer purchases. However, "leakage" in either a real or a statistical sense (in reduced leverage value for the economy, or in excess of transactions included for CSP over transactions included in the personal consumption expenditures aggregate) should prove relatively minor.

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The Economics of *Scrabble*

This study investigates the applicability of certain general economic principles to SCRABBLE, a game assumed to be too well known to require description. The study is not an exercise in the theory of games; it is diametrically opposite to it. The theory of games takes its cue from the rather distressing proposition that the road to a proper theory of economic behavior passes through the study of the simplest of games, such as "Matching Pennies." The present paper radiates the much more self-satisfying philosophy that games, even such sophisticated games as SCRABBLE, can learn a lot from existing economics.[1]

In its relation to its subject, the study may well be compared to the economics of the firm. Mastery of this branch of economics is obviously not indispensable to satisfactory business management. But it helps the economist to understand what successful managers do; and it also helps managers to understand what they have usually been trying to do all along, and to do it better. Very much the same holds for the economics of SCRABBLE. Its mastery is not a substitute for the memorization[2] of *Webster's Unabridged;* but it helps.[3]

While some of the expositional devices used are borrowed from mathematics, the study is essentially economic in nature. Economics provides the analytical, as distinguished from the expositional, tools.

1. *The Proper Thing to Maximize*

One of the achievements of economics is to select the proper thing to maximize in each situation. As Samuelson has put it: "The study of maximizing behavior affords a unified approach to wide areas of current and historical economic thought."[4] Some businessmen might be inclined to maximize turnover; but clearly the wise thing is to maximize profit (or even better profit over time, suitably discounted). Some people might aim for maximum income; they should realize that what they really want is the optimum balance between income and leisure. While others might be satisfied to maximize some gross concept, the economist is always on the lookout for the costs and hence for the proper net concept to maximize.

In SCRABBLE, there is a clear gross target: to get as many points as possible. That is the objective which the inexperienced player tries to achieve ***in each move***. Is there a cost?

2. *Alternative Use*

Economics points the way directly to what the "cost" element must be: alternative use. When a letter is used to make one particular word there is a sacrifice of the score that might have been obtained with the same letter in

[1] As in almost any use of tools in a new field, some refinement of the tools is found as a byproduct. See footnote 6.

[2] *Webster's New International Dictionary,* 2nd ed., unabridged, p. 1534.

[3] There is also a (relatively minor) strategy element in SCRABBLE, with which this paper does not deal.

[4] P. A. Samuelson, *Foundations of Economic Analysis* (Cambridge, 1947), p. 23.

another word. This is the key to the calculation of economic costs, which involves three steps.

Step 1. According to the information provided by the manufacturer, the total score of the game may be from 500 to 700 or more, or say, on the average, about 600. This is about three times the aggregate face value of all letters—187 for 100 letters, whose individual face values run from 1 (A, E, I, O, U, L, N, R, S, T) to 10 (Q and Z). This ratio, 3, we call the *multiplier* (M). A somewhat higher multiplier would be indicated for superior players.

Step 2. Ultimate value in the economic sense should be based on relative scarcity. We observe that the frequency of the letters in the game—from 12 E's to one each for J, K, Q, X, and Z, appears to be approximately in proportion to their frequency in the universe of the dictionary. It follows that their marginal usability to make words should be about the same, and hence their marginal utility, in terms of score value, should be proportional to their face value.

Step 3. Since (a) the total score value of all letters equals the multiplier times their aggregate face value and (b) their individual score values are proportional to their individual face values, it follows that the economic cost of an individual letter is found as the multiplier times the face value of that letter. With a multiplier of 3, for instance, a letter with a face value of 4, like H, must be reckoned as costing 12 if used in a particular score.

3. *Special Accounting Prices*

While decentralized cost calculations based on market prices may be assumed to perform tolerably well as an allocative device for most purposes, it is recognized in economics that sometimes prices other than those prevailing in the market, "accounting prices," have to be used to obtain a proper social optimum.[5] This principle has an important corollary in SCRABBLE. In the following instances there is ground for the use of special accounting prices, instead of face values, in computing costs. (a) To some extent the frequency of SCRABBLE letters may deviate from that in the real world, due for instance to indivisibilities (one feels that half a Q would be ample, and economists would like to have a chance to show off their training if they could once in a while get 2 K's to make "kinked"). (b) There are also letters that are particularly useful, like the S for making plurals. (c) There is, lastly, the particular skill of the player. To a player who has just memorized all the Z-words of the dictionary a Z has obviously a higher opportunity value than to one less erudite, and this should be reflected in his individual cost calculations regarding the use of the Z.[6]

[5] J. Tinbergen, "The Relevance of Theoretical Criteria in the Selection of Investment Plans," Conference on *Investment Criteria for Economic Growth*, mimeo. (Cambridge, 1954). Also for a particular application to the exchange rate: H. B. Chenery, "The Application of Investment Criteria," *Quart. Jour. Econ.*, Feb. 1953, LXVII, p. 76-96.

[6] This points to a necessary elaboration of Schumpeter's theory of the entrepreneur. His 19th century entrepreneur was apparently satisfied to pursue any reasonably handsome profit by introducing some new combination while buying factors of production on the

4. *Replacement Letters*

The analysis of cost has proceeded so far on the assumption that a letter used has to be calculated fully as a cost item. But, under the Rules, each letter used is replaced by another one. Since each replacement letter is drawn face down, its value cannot be known: the theory has to be based on its *probable* value being the *average* value of all letters,[7] *i.e.* 187 ÷ 100 or, after rounding, 2. Allowing for replacement we find that a letter used has a *net* cost of multiplier × (face value[8] − 2).

By an involved process of reasoning it can be shown that no allowance is necessary for the fact that by drawing, say, x letters from those still remaining, a player reduces the number of letters that he will be able to draw in the future. At first sight it would seem that he does reduce his ultimate supply of letters by a number which might be approximated as $\frac{x}{n}$, n being the number of players. This would set him back in score by $\frac{2Mx}{n}$, 2 being the rounded estimated probability value of each letter foregone. But further consideration leads to the conclusion that not only this player, but *every* player, will lose $\frac{x}{n}$ letters as a result; and assuming, as a first approximation, that all play equally well, *i.e.*, that they operate with the same M, each will lose $\frac{2Mx}{n}$ in score. If then our player's objective is to win, rather than to amass the largest absolute number of points, any adjustment that applies equally to all players may be disregarded. We should note, in passing, the important finding that, since n will not appear in our formula, the economically best way of playing SCRABBLE is independent of the number of players.

5. *The Formula*

Summarizing the above we find that a player should maximize at each move his profit P, computed as follows:

$$P = S - M \sum_{i=1}^{i=x} (v_i' - 2), \qquad (1)$$

basis of their cost (= opportunity value when used in the circular flow). But the man who has a variety of tempting entrepreneurial possibilities among which his staff must choose must obviously calculate as part of the cost of any one of them the profit to be made in a "normal" entrepreneurial exercise. As Mr. Wolfson (to quote a 20th century entrepreneur rather than an economist) stated to *Life* about his only business mistake, making several hundred thousand dollars in movies: "But we took a couple years to do it and that's tying up too much time and capital for that size result." (*Life*, Nov. 22, 1954, p. 179).

[7] Making no adjustment for any possible difference from the average of the letters that have already been drawn earlier in the game.

[8] Adjusted face value where appropriate.

where: S is the score to be made in the move
M is the multiplier (about 3), and
v_i' is the (adjusted) face value of any letter i ($i = 1, 2, \ldots x$) used.

6. *Practical Application*

A. *Choice between alternative simultaneous possibilities.* Formula (1) is easily applied in practice to decide which of various alternative possibilities yields the highest P. It takes little time or skill to subtract 2 from the face value of each letter to be used, to add up the results and to multiply by 3.

Since our formula, through use of the cost principle, allows for the value of future use, it also indicates whether, where there is any choice, an additional letter should be used, or whether it is more profitable to save it for later. For this purpose, however, the formula can be considerably simplified.

B. *Intertemporal allocation.* For this purpose we transform the formula into an expression for the marginal profit attributable to the use of an individual letter (P'), as follows:[9]

$$P' = kv - 3(v - 2) \tag{2}$$

where $k = 1, 2, 3$, depending on whether the score made with the letter is single, double or triple. This reduces to:

$$\left.\begin{array}{ll} P' = 6 - 2v & k = 1 \\ P' = 6 - v & k = 2 \\ P' = 6 & k = 3 \end{array}\right| \tag{3}$$

From this follow a number of rules:

Rule I. Letters with face values of 1 and 2 *should*, and letters with face value of 3 *may*, be used whenever there is an opportunity. Even when they score singly, they will yield a nonnegative profit.

Rule II. Letters with face values of 4 and 5 should not be used unless they score at least double—(but do not wait for triples!)

Rule III. Letters with face values of 8 and 10 should be kept for triple scores, but with two very important qualifications: (a) Only a small discount for their adjusted value (v') below v is necessary to justify, *i.e.*, to compel, use of these letters if only a double score is the best that can be made.[10] (b) No allowance has been made so far for the fact that the game is in practice played with a finite number of letters, and that a penalty attaches to remaining stuck with a letter at the end of the game. For these high-value letters with limited usefulness a correction for this is needed (for other letters its

[9] Assuming $v = v'$ *i.e.*, face value equals accounting value.

[10] The required discount is derived from (2), taking $k = 2$ and stipulating $P > 0$:

$$2v - 3v' + 6 > 0$$
$$v < 2/3v + 2$$
$$\text{For } v = 8,\ v' < 7.33$$
$$v = 10,\ v^1 < 8.67$$

effect would be negligible). It consists in subtracting from the cost of using the letter now an estimate of the probable loss at the end of the game due to the impossibility to use the letter in the future. The amount involved is $q^m \cdot v$, where q is the probability that one cannot use that letter in one move, and m the estimated number of moves the player expects to have ahead of him. If, for instance one can use a Z ($v = 10$) only once every five moves ($q_z = .8$) and one expects to have only four more moves left, the correction would be $.8^4 \times 10 = 4.1$. This would make P' just positive for $k = 2$.

These Rules are by no means self-evident. Thus Rule II is violated in one of the few examples which the manufacturer provides with each set. In this example an F ($v = 4$) is used, without necessity, to yield only a single marginal score.

Despite the theoretical complications involved in the derivation of these Rules, it will be found that they can easily be followed in practice, even by beginners.

J. J. Polak

Dollar Pooling in the Sterling Area: Comment

In a recent article, "Dollar Pooling in the Sterling Area,"[1] Kenneth M. Wright has made an excellent contribution to the understanding of one important aspect of the sterling area. There are several comments, however, that might usefully be made.

Wright states that "one major qualification" is necessary to the tables he presents on the sterling countries' yearly positions with respect to the dollar pool. This qualification is that because of the intrasterling-area transactions in "dollar-saving exports" the country figures, even if perfect,[2] would not show the "true contribution" which each country has made to the problem of the entire sterling area's dollar shortage.[3]

I think that there is a more important qualification that needs to be made. The contribution a sterling-area country is making towards the solution of the entire sterling area's dollar shortage must be measured not only by its bilateral position vis-à-vis the dollar area but by its global balance of payments. This latter provides a measure of the degree to which the country makes necessary a drain on the external resources of the area or contributes to building up the external resources of the area. Note, for example, that in

[1] *Am. Econ. Rev.*, Sept. 1954, XLIV, 557-76.

[2] Wright mentions that the dollar accounts of the sterling-area countries other than the United Kingdom are underestimated when these countries do not take account of dollar goods received through intermediaries in the United Kingdom. The share of the United Kingdom is also exaggerated because: (a) The dollar cost and proceeds of goods that undergo processing in the United Kingdom and that enter into intrasterling-area trade are allocated to the United Kingdom in the U.K. balance of payments accounts; (b) The whole of the British oil companies' production expenditure in dollars is allocated to the United Kingdom in the British accounts though much of the output is consumed in the rest of the sterling area; (c) Dollar investment in the rest of the sterling area by American companies often appears in the balance-of-payments statements of those countries (*e.g.*, Southern Rhodesia) as the receipt of sterling.

[3] Wright, *op. cit.*, p. 573.

Wright's Table I, the biggest single drain on the central reserves over the period 1946-52 was "Transactions with nondollar areas on whole sterling-area account." These were gold and dollar payments made necessary by the position of the whole sterling area vis-à-vis a particular country or area which converted into dollars or gold only a part of its sterling receipts, *e.g.*, the European Payments Union. During this period such gold and dollar payments were made at one time or another to most of the nondollar nonsterling world.

The January 1954 Commonwealth Finance Ministers' conference emphasized in its final communiqué that while the sterling-area countries should maintain their efforts to achieve a dollar surplus directly, it was just as important to earn a substantial surplus in other nonsterling currencies.[4]

With the expansion of the transferable sterling account system to almost the whole of the nondollar nonsterling world in March 1954 there can be seen even more clearly the important influence the nondollar part of the sterling-area countries' balances of payments exerts on the dollar position of the sterling area. If the sterling-area countries make available too much sterling to the rest of the world, the central dollar reserves are sure to suffer. Transferable sterling becomes cheap in New York and commodity shunting begins:

> . . . a sterling commodity is sold by a Continental merchant to the United States. He wins the business on competition with a British merchant because he uses a cheaper type of sterling and can therefore offer a lower price. The dollars he gains are lost to the sterling area; they are reconverted into sterling in the transferable market.[5]

Also,

> . . . there is no difficulty about the import into this country [the United Kingdom] of many dollar commodities which are then reexported to the continent against payment in sterling.[6]

The sterling part of the balance-of-payments accounts of a sterling-area country is also important. An obvious example: if India has a balance with the nonsterling world but a deficit with the United Kingdom financed by drawing down its sterling balances, it will absorb British products which might have been sold for dollars.

I think that the foregoing should be sufficient to make the point that in assessing the contribution made by a sterling-area country to the dollar position of the whole area, it is necessary to consider not only its dollar accounts but its global balance of payments.

On the other hand, I do not feel that the principle cited by Wright (p. 573) that "exports to sterling countries which save dollars for the common reserves

[4] The need for improving the global balance of payments has been repeatedly emphasized by the Commonwealth Finance Ministers' conferences. The December 1952 conference, for example, stated: "An adequate and stable external balance must be a first objective for all Governments."

[5] "Shunting Backwards," *The Economist*, Feb. 12, 1955, CLXXIV, 557-8.

[6] *Loc. cit.*

are as valuable as exports which earn dollars" has much meaning in this type of analysis.[7] It is perfectly true that on a few occasions countries in the sterling area have tended to advance this as a kind of justification of their position when they were showing heavy dollar deficits. The virtue of this "principle"—and its fundamental defect—is that almost everything can be plausibly cited as being a dollar-saving export. When Australia provides wheat to England and England provides machinery to Australia both can feel a glow of satisfaction for thus saving dollars for the common reserves and at the same time continue to be net drawers of dollars from the dollar pool.

The dollar accounts of a sterling-area country and its net position vis-à-vis the dollar pool can be more or less ascertained. Similarly its global balance of payments can be ascertained and these two together provide a basis for a judgment of the contribution that each member is making to the solution of the area's dollar problem. And, of course, as the world currencies became more and more convertible *de facto* the latter element becomes more and more important. There is no need for any attempt to assess the purely hypothetical dollar-saving elements in intrasterling-area trade.

On the whole, although Wright's discussion of the position of the outer sterling-area countries is good, a few slips have occurred in treating the position of the Colonial territories.[8]

A fairly serious error occurs in two places: on page 569, he says, the dollar contribution of the colonies ". . . is slightly more than the rise in sterling balances held by the colonies since 1946, and in effect, represents a rather curious capital movement from the colonies to the United Kingdom in the form of dollar exchange." On page 574, he says, "Lacking autonomy in their own dollar-import policies,[9] they [the colonies] have contributed almost $2 billion to the pool in 1946-52 and have accumulated sterling balances of roughly equal size during the same period. The colonies have thus been exporting capital to the United Kingdom in the form of dollar exchange." This point is a good example of a *non sequitur*. The fact that colonial sterling balances have increased does not necessarily mean that the colonies as a bloc have been exporters of this amount of capital to the United Kingdom (though several of the colonies have exported capital to the United Kingdom during this period). It could even mean that the United Kingdom has made more capital available to the colonies as a whole than the colonies could absorb.[10]

[7] One possible exception—and it would apply to only a few cases—would be where a sterling-area country in choosing between two new investments, each yielding the same return, would choose the one that would produce a replacement for dollar goods.

[8] For example, he says on page 561, "Colonial dollar earnings are surrendered to the local exchange controls and transferred to the Bank of England or its authorized dealers." The typical case, in fact, is rather that of a colony whose foreign trade is handled by banks with head offices in London or by trading or producing companies with headquarters in London. The dollars earned by exports to the dollar area never see the colony but stay in London. The local producers get the money they want—local currency or sterling balances.

[9] It is not correct to say that the colonies lack autonomy in their own dollar import policies. It would be more accurate to say that the colonies are more amenable to persuasion on this than are the fully independent members of the Commonwealth.

[10] *Cf.*, movement in European gold and dollar reserves during Marshall Plan period.

To illustrate my point by a particularly fortunate example: in 1953, the colonies, excluding Hong Kong, had a deficit on current account of £15 million,[11] yet colonial sterling balances, excluding Hong Kong, went up by £57 million.

There are some corrections in Table III on page 571 that Wolfgang Weigel has called to my attention: Table III shows a gold and dollar contribution to the central reserves by Australia in 1950 of $24 million. It should be $54 million. The difference is equal to the amount of gold sales to the United Kingdom which were probably not taken into account. Pakistan's drawings are shown as $11 million too high in 1951, and too low in 1952. This is probably because the $11 million gold purchase was ascribed to 1951 while it actually occurred in 1952. The same is true of the gold purchase of $11 million by Ceylon. It occurred in 1951 rather than 1950. In 1952, the figure for Southern Rhodesia is $15 million too low, perhaps by reason of the omission of gold sales of this amount to the United Kingdom. Footnote *ii* of the table states that statistics were not available for several countries, among these Iceland and Iraq: regional balance-of-payments data are available for Iceland in the *Balance of Payments Yearbook* of the International Monetary Fund. Published figures are also available for Iraq for the years 1951 and 1952 in the *Quarterly Bulletin of the National Bank of Iraq*, Nos. 3 and 7.

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[11] Colonial Office, *The Colonial Territories 1953-54*, Cmd. 9169 (London, 1954), p. 53.

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Dollar Pooling in the Sterling Area: Comment

K. M. Wright's article, "Dollar Pooling in the Sterling Area" in the September 1954 number of this *Review* is a useful and interesting account of the policy declarations and statistical results of the "dollar pool" which has been functioning in the sterling area. However, his interpretation of the position of the British colonies in the pool's operations is apt to be misleading because it ignores certain important conditions that underlie the financial results tabulated in the Balance of Payments White Paper. I refer in particular to his statement, "United Kingdom colonies were of great importance in bolstering the dollar reserves between 1946 and 1952. Their contribution is slightly more than the rise in sterling balances held by the colonies since 1946, and in effect, represents a rather curious capital movement from the colonies to the United Kingdom in the form of dollar exchange" (p. 569), which is later amplified, "For the colonies, however, dollar pooling has had serious drawbacks. Lacking autonomy in their own dollar import policies, they have contributed almost $2 billion to the pool in 1946-52 and have accumulated sterling balances of roughly equal size during the same period. The colonies have thus been exporting capital to the United Kingdom in the form of dollar exchange" (p. 574).

As Mr. Wright also states, however, not all the colonies have been net contributors to the dollar pool. Some have run substantial deficits, and many have not had significant balances either way. Clearly, therefore, they have

not all suffered hardship of the same kind or for the same cause. Nor has their lack of autonomy had a uniform effect upon their dollar expenditures. This lack of "complete autonomy" in foreign exchange policy is a logical consequence of the colonies' general monetary relationship to London, and in comparing their position to that of the "independent members of the sterling area" it should be remembered that the colonies are in practice overseas parts of the United Kingdom monetary system, and have no responsibility for maintaining foreign exchange reserves or taking any other measures that would affect the value of their own currencies. Moreover, they did not have rationing and tax controls on consumption in the postwar period to the same extent the United Kingdom did, and hence import licensing was practically the only method of controlling the demands (reflecting war-inflated incomes) for goods and currencies of which there was a global scarcity. The colonies have been notable beneficiaries of the postwar rise in raw material prices, and this has played an important part in increasing the level of international monetary reserves which it has been necessary for London as the banker for the sterling area to hold.

But while the colonies had to pursue the same fundamental policy of exchange control as the United Kingdom, every colony had its own government department for administering its import and currency regulations with some discretion as to the actual goods that were admitted or excluded. And these separate administrative methods led to a wide variation in local control practices. Underlying the major differences in dollar expenditure were of course the differing needs between colonies for essential imports. The West Indies, for instances, had to have flour from Canada, and Jamaica built tourist hotels with United States materials, but in the West African territories such imports were not of the same urgency. There may be room for doubt as to whether the operations of the local controllers had ideal results in every colony, but their existence did mean that the total dollar expenditure of each colony as well as the particular goods imported depended in some degree upon the case the local authorities presented to London and the decisions they made in issuing permits to applicants.

The central error in Wright's argument, however, is his insistence that the automatic consequence of contributions to the dollar pool was a corresponding export of capital by the colonies to the United Kingdom. For evidence of this relationship he seems to rely on the statistics of rising colonial "sterling balances" since 1946, although it is easy to find a superficial defect in this reasoning in the fact that colonies with dollar deficits as well as those with dollar surpluses have been increasing their sterling balances. In reality the two processes of regulating dollar expenditures and acquiring London assets are quite distinct. The colonial recipients of dollar exchange pay it into their bank and receive an equivalent amount of sterling which they are free to spend for any purpose except prohibited imports. The fate of the dollars contributed to the pool is quite independent of the use ultimately made of their sterling equivalent. And independent also of contributions to or drawings from the pool is the accumulation of the government and banking assets known as sterling balances. These are chiefly the consequence of colonial

government methods of finance which involve holding liquid and invested funds in London, and they are related to the system of internal taxation, not to foreign exchange control. They derive from taxes raised in each colony, from deposits in savings and commercial banks, and from such special items as the reserve funds of the postwar Commodity Marketing Boards. These colonial sterling balances have nothing in common with the similarly classified wartime accumulations of some other parts of the sterling area, and their increase is a reflection of general economic conditions since the war. Colonial residents who receive sterling in exchange for dollars are free to invest it in other parts of the sterling area, and most of this investment goes through London, but the assets of private investors are not shown in the official statistics of sterling balances to which Wright refers. That is to say, these statistics do not include the whole of the capital movement from the colonies to London. They do, however, aim at showing total dollar transactions. That the *ex post* record on this basis should make the colonies appear to be deprived of dollars—and capital—to exactly the same extent that they acquired sterling balances seems to be one of those results that Hollywood calls entirely coincidental.

If we want to attribute monetary implications to the statistics of colonial trade it is important to remember that the recorded import-export figures for each colony do not show with exactitude either the currency receipts available to people in the colony or the total claims on dollar sources represented by its imports. This discrepancy arises for two reasons. One is that a part of the proceeds of certain exports, *e.g.*, rubber, tin, copper, lead and zinc, tea, sugar, etc., go to company funds and investors in the United Kingdom where the producing concerns are owned and controlled, and hence the total value of exports is not distributed to people in the colonies for spending on goods from any source. The colonies showing a significant dollar surplus are those where there is a substantial United Kingdom investment in export production. The other reason is that the imports of most colonies include a high proportion of manufactured goods from the United Kingdom which incorporate part of the United Kingdom's own dollar imports of raw materials and components, particularly cotton, wheat, tobacco, paper and chemicals. And in this connection it must be recalled that consumption in general was not so restricted in the colonies in the postwar period as it was in England, and people in the former could buy all they could afford from sterling sources, even when people in the United Kingdom could not.

In claiming further (p. 574) that "broadly speaking, the United Kingdom has been able to maintain its capital exports to the independent sterling countries only by passing on to them much of the dollar aid received during the early postwar years, and by importing capital from the colonial sterling area in more recent years," Wright seems to ignore the steady flow of both private and public capital to the colonies since the war. Investment in many large-scale industries has been increased. For instance, in oil, bauxite, copper and base metals, gold, diamonds, sugar and sisal, and also in light and power installations, in harbors, docks, roads and railways, and a variety of minor industries. Several colonial governments have raised loans in London, and

some municipal issues have been floated there for the first time. In addition to these market transactions there have been two special organizations, the Overseas Food Corporation and the Colonial Development Corporation, established for making investments with Treasury funds, and the colonies have made regular drawings from the development and welfare funds voted by Parliament. Also, there are always emergencies and disasters, such as floods, famines and hurricanes, for which *ex gratia* payments are made by the United Kingdom. Detailed information on these matters is given in the Secretary of State's annual report to Parliament on the Colonial Territories.

In the postwar decade a vigorous policy of economic development has been pursued in most parts of the Commonwealth, and dollar drawings from the pool have in large part been determined by the import requirements of this policy. For various reasons, not all monetary, the colonies have obtained most of their capital imports from the United Kingdom, but this fact alone is not evidence that their development plans and projects have been handicapped by lack of dollars. It is an error of still wider implications to think that the United Kingdom depends for maintaining its international economic position upon the capital it arbitrarily "imports" from the colonies. This is to misrepresent not only the monetary position of the colonies but also the whole problem of sterling.

IDA GREAVES*

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Reply

Although the points raised in the comments of Miss Greaves and Mr. Kamarck are interrelated, I will discuss separately each of the major questions raised by them.

1. Miss Greaves asserts that colonial sterling balances "derive from taxes raised in each colony, from deposits in savings and commercial banks, and from such special items as the reserve funds of the postwar Commodity Marketing Boards." Although sterling assets held by colonies may be classified in terms of ownership in this manner, this approach obscures the fact that sterling balances rise or fall primarily as a result of the balance of payments of the colonies. Whether net export proceeds are deposited in savings and commercial banks, or taxed by colonial governments, or kept as reserves by the marketing boards and price assistance funds does not matter in this context—colonial balances nevertheless arise largely from external transactions.

2. Sterling balances owned by the colonies are the financial counterpart of the real resources to which the colonies have a claim, but have released to others; instead of using these resources at home, the colonies have allowed others to use them. In this sense, the colonies are net exporters of capital when there is a rise in colonial sterling balances. When the colonies have a dollar surplus and contribute such dollars (as well as gold) to the dollar pool, the transaction may be considered as a release of claims over dollar goods and

therefore an export of capital in the form of dollar exchange; in exchange for dollar claims, sterling balances are increased. At the same time, of course, the colonies may be incurring deficits with nondollar countries and drawing down sterling balances by reason of such deficits, representing an import of capital in the sense outlined above. Taking both dollar and nondollar transactions together, the colonies could be either net exporters or net importers of capital vis-à-vis the rest of the world (and therefore increasing or decreasing sterling balances), depending upon the size and direction of the two types of transactions.

The only available statistics that use consistent definitions and coverage for the external colonial transactions are those for transactions with the dollar area (on current and capital account) and for the changes in colonial sterling balances, shown in Table I. These data reveal a parallel movement in

TABLE I.—COLONIAL EXTERNAL TRANSACTIONS
(in millions of pounds)

	Transactions with the Dollar Area	Change in Colonial Sterling Balances
1950[a]	+156	+172
1951	+174	+195
1952	+139	+104
1953	+101	+ 68
1954	+108	+124
1950–54	+678	+663

[a] Includes Northern Rhodesia, which is subsequently excluded from the balance-of-payments definition of "United Kingdom colonies."

Source: Cmd. 8976, *United Kingdom Balance of Payments, 1946 to 1953* (London: HMSO, 1953); Cmd. 9430, *United Kingdom Balance of Payments, 1946 to 1954*, No. 2 (London: HMSO, 1955).

the rise in colonial sterling balances and the colonial contributions to the dollar pool resulting from current and capital transactions with the dollar area (including gold sales to the United Kingdom). What is missing in these accounts is (a) colonial current accounts with the nondollar world,[1] and (b) colonial capital accounts with the nondollar world. Data which are not fully consistent with those of the table indicate that the colonies incurred rather sizable current-account deficits with other sterling-area countries; these deficits were probably offset in part by an inflow of financial capital from nondollar countries (mainly the United Kingdom). It would appear that nondollar colonial transactions on current and capital account largely washed each other out; consequently, the dollar contributions of the colonies may be

[1] Data on the colonial current accounts since 1950 are available in the Colonial Office reports on *The Colonial Territories*, published yearly, but comparison with data on colonial dollar transactions is prevented by differences in coverage. For example, Hong Kong is excluded from colonial current account statistics, while the Rhodesias are excluded from the definition of "United Kingdom colonies" in the United Kingdom balance-of-payments statistics on colonial dollar transactions and colonial sterling balances.

considered as primarily responsible for the increases in sterling balances over this period. The only other candidate for this role, suggested by Kamarck, is the flow of unabsorbed financial capital to the colonies from the nondollar world, but fragmentary data indicate that this factor is only a runner-up far behind in the competition. Although the changes in sterling balances and the transactions with the dollar pool obviously do not match up year by year and colony by colony, since a host of other factors comes into play, I still submit that it is valid to view the colonial dollar contributions both as exports of capital in the form of dollar exchange, and as a strategic factor in the postwar rise in colonial sterling balances.

3. Regarding the degree of autonomy over import policies which the colonies possess, Miss Greaves declares that every colony had "some discretion as to the actual goods that were admitted or excluded," and that "the total dollar expenditures of each colony as well as the particular goods imported depended in some degree upon the case the local authorities presented to London. . . ." But this description does not tell us how far such autonomy went in practice. Available statistics reveal that colonial dollar imports did not in fact keep pace with those of other members of the sterling pool during the greater part of the postwar period, as may be seen from Table II.

TABLE II.—STERLING AREA DOLLAR IMPORTS

	Millions of U.S. Dollars			1948 Value=100		
	United Kingdom	U.K. Colonies	Other Sterling Area[a]	United Kingdom	U.K. Colonies	Other Sterling Area[a]
1948	1,634	310	875	100	100	100
1949	1,606	220	805	98	71	92
1950	1,206	135	590	74	44	67
1951	2,055	215	1,100	126	69	126
1952	1,668	195	1,165	102	63	133

[a] Excluding South Africa, which did not coordinate its dollar import policies with the rest of the sterling area.

Source: Cmd. 8976, *United Kingdom Balance of Payments, 1946 to 1953* (London: HMSO, 1953). The 1948 base is appropriate because sterling area dollar import restrictions had been universally tightened following the 1947 convertibility crisis.

4. As to whether the international position of sterling has been misrepresented by an emphasis on rising colonial sterling balances, I can only suggest that the reader imagine the position of sterling should the colonies begin drawing down balances at the rate they have been built up, and also become drawers on the dollar pool to the extent that they have been contributors in the past. Several other points raised by Miss Greaves do not seem to relate to my article, and although I disagree in part, I feel that no reply to them is called for.

5. I can agree with Kamarck that in a regime of convertible currencies the global balance of payments of a sterling country is an important criterion in

measuring a country's contribution to the external position of the entire sterling area. However, in the lopsided world of inconvertibility, the payments position vis-à-vis certain currency areas cannot be ignored, and a somewhat lopsided treatment of the problem becomes highly relevant. Kamarck points to the drain on central reserves arising from transactions with European Payments Union countries requiring partial payment in gold or dollars. But the distinction between dollar transactions and EPU transactions is one of degree not of kind from the sterling-area viewpoint. Deficits with the dollar area produced a roughly equivalent drain on the central reserves, while deficits with EPU countries led to partial drains on reserves, depending upon the quota position of the sterling area in the EPU at any given time. My article was devoted to the measurable aspects of contributions and drains on the dollar pool by sterling-area members, but the drain through EPU transactions (and transactions with other nondollar, nonsterling countries) does not lend itself to measurement by sterling countries, important as it was in the reserve problems of the sterling area. As Kamarck states, "as the world currencies become more and more convertible *de facto* the [global balance of payments] becomes more and more important." I agree, but sterling was not convertible during most of the period discussed, and the distinctions drawn in my article certainly apply.

6. The "principle of dollar-saving exports" was included in my analysis as an illustration of the pitfalls in measuring dollar contributions with the available statistics, but was not intended to exclude other statistical shortcomings such as those Kamarck points out. The "principle" does, I think, lead directly into the insuperable problem of measuring dollar contributions in the thorough-going economic sense, and I am certain that the extent to which each transaction of each sterling country does save dollars cannot be accurately measured. The question appears to be how far such analysis should be carried; Kamarck seems to suggest that it should never be attempted. As a solution, he proposes that both dollar accounts and the global balance of payments for each sterling country be examined as a basis for judging the contribution of each member to the sterling area's dollar problem. I believe my article has at least brought together the dollar accounts, but it is not clear to me what sound "judgment" could accurately be made by examining them in conjunction with global accounts for each sterling-area member, or whether two separate and objective "judgments" would produce the same opinion.

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BOOK REVIEWS

Economic Theory; General Economics

Man, Motives, and Money—Psychological Frontiers of Economics. By ALBERT LAUTERBACH. (Ithaca: Cornell University Press. 1954. Pp. xvi, 366. $5.00.)

Over many centuries, discourses on economic affairs have included explicit or implicit theories of human nature, of motivation, of calculations as to monetary costs and returns and as to utility and disutility. Psychological variables or aspects of economic life have been treated in innumerable book-sections and articles, but not many authors have felt called to the task of treating such matters at book length. Thus, the appearance of the volume here reviewed, soon after that of Katona's *Psychological Analysis of Economic Behavior*,[1] is an event of much interest.

Lauterbach, a teacher of economics, has had some associations with Katona and others in the University of Michigan Survey Research Center, and, as appears below, he uses some of the Center's output. It seems, however, that the bulk of his equipment and interpretations represent other trends in research—notably what we might designate as psychiatric sociology. Anthropological and comparative-economic materials are also fed into his hopper. Although the history invoked is mostly recent, in general his outlook is reminiscent of historical and institutional discussions of economic premises and methodology. His achievement, he says (p. 236), is "not by any means a general theory of economic psychology"; its "aspiration is far less ambitious. . . . The author feels no more ready to present any such theory than do most other researchers right now. He is also uncertain whether the disciplines concerned have cleared the way toward it sufficiently at this juncture."

The book includes eleven appendixes, a majority of which are derived from Survey Research Center publications, on such matters as industrial relations, views of large and small businesses, labor unions, and government, and "war dangers and worries." (This last phrase is in line with Lauterbach's strong emphasis on the incidence of personal insecurities.) One appendix appears to be based on a psychiatrist's notes; another, entitled "Incentives in Nationalized Plants in Austria," is based on interviews in that country by Lauterbach in 1950. The Survey Research appendixes contain tabulations, and these are given some discussion in the text-chapters; but in general Lauterbach does not display much enthusiasm for the quantitative psychological material now available. (But we must remember that the expenses of money, time, and effort involved in significant quantitative social research are prohibitive for most professors.) In addition to the novel material from the author's Austrian interviewing, this book contains many reflections of his cosmopolitan, polylingual background; and his writing is remarkably fluent

[1] Reviewed in this journal, Dec. 1953, XLIII, 931-33.

and clear, considering his tendency to manipulate more or less psychiatric concepts such as "parental images" and the numerous varieties of inferiority and insecurity states of mind.

In a few pages of introduction, three sets of problem-questions are indicated as giving the scope of the book. They begin as follows: "(1) To what extent does business behavior in our existing society actually follow those rules of economic decision making which economic analysis has assumed or developed? . . . (2) Assuming that economic instability, intentionally or not, is a concomitant of a private business economy, to what extent and in what ways has such instability prevented individuals and groups from acting 'economically'? . . . (3) To the extent that any such hope is legitimate, does economic reform of any desirable type presuppose a different kind of human being from the one that we have known thus far, especially in Western democratic countries? . . ." These themes are treated through four lengthy chapters, which are followed by a fifteen-page chapter of "Summary and Conclusions." (Here I recall Commons' remark, in *Industrial Government,* as to why he called the final chapter "Inferences" rather than "Conclusions.")

The language here quoted from the introduction almost suggests the author's (tentative) answers. Like many other "discussants" of such matters, Lauterbach finds actual behavior in business enterprises extremely variable, in part by reason of differing sizes of firms; and his conception of "those rules . . . which economic analysis has assumed or developed" appears to give insufficient weight to the institutional elements which are rather prominent in, *e.g.*, Mill and Marshall. Sensible economists have long, if not always, realized that the simple "model" of the immediate-profit-maximizing "economic man" is at best only a bare framework for the beginning of analysis of "capitalist" economy. And with reference to the second question quoted above, we may find much of interest and importance in Lauterbach's discussion of instability and insecurity. The phrase, however, "concomitant of a private business economy" might well lead to more consideration of the extent to which conversion of private-profit-seeking enterprise into private-nonprofit and governmental enterprises may be expected to effect a net reduction of insecurities.

The foregoing comments may indicate some of my notions as to important ingredients somewhat underrated in Lauterbach's treatment of his third group of questions—more directly concerned with motivation and reasonable expectations as to social-economic reforms. But on the whole his discussion here seems distinctly enlightening. He holds, of course, that a considerable range of (specified) targets of amelioration may be approached without "presupposition of a different kind of human being"; and through the book considerable research material is indicated as supporting this view. His optimism, however, is restrained and cautious, leaning perhaps toward the view that large enterprises such as the hydro-electric power project, about which he interviewed people in Austria, are most likely to be suitable for government ownership—if the public bureaucracy averages as high in ability and probity as the big-business bureaucracies of the nation concerned.

Z. Clark Dickinson

University of Michigan

Das Konkurrenzproblem im Oligopol. By RUDOLF RICHTER. (Berlin and Munich: Duncker and Humblot. 1954. Pp. 112. DM 8.00.)

The first half of this recent German contribution to the theory of oligopoly consists of an extensive and clear account of ten versions of the theory, *i.e.*, the models presented by Cournot, Bertrand, Hotelling, Frisch, Chamberlin, Stackelberg, Schneider, Kaysen, Fellner, and Brems. According to Richter, all are unsatisfactory, either because they assume the existence of a reaction function that is bound to turn out to be invalid, or because their solutions are merely subjectively, but not objectively, rational.

Richter's positive contribution is as follows. There are two distinct problems to be solved, one at the industry level, one at the firm level. Industry behavior is a matter of fixing the price of the industry's product, price and product being assumed to be common to all firms. Under such assumptions it is legitimate for Richter to draw a downward-sloping industry demand curve. At what point will industry fix its price? The reasoning here is far from clear, but let us reproduce it for what it is worth. Once the industry price had been set, industry sales would have been determined, and firms would regard firm revenue as being in direct proportion to the firm's quantity sold. Assume that production cost and selling cost as well are in direct proportion to quantity sold. Profits will then be in direct proportion to quantity sold and thus to firm revenue. So far we can follow Richter without difficulty. But then he says that since in an oligopolistic market the emphasis is on revenue and market share (one firm can gain revenue only by depriving another of revenue), then industry price is best set at the point where industry revenue is maximized. Richter seems to be aware of the fact that when costs exist industry revenue is maximized by a lower price than industry profits, but he does not convince his reader that industry revenue rather than industry profits should be maximized.

The second problem is to determine firm behavior. Once the industry pie has been determined, firm behavior will determine the slices of the pie falling to each firm. What are the variables used for this determination? Price being now beyond the control of the firm, and quality of product being assumed to be constant and identical as among firms, only advertising remains. But even here there is the constraint that advertising cost per unit of product sold must remain constant. So firms fight for market shares not with advertising budgets but merely with good ideas as to how to spend those budgets. Jastram is quoted in defense of this assumption which sounds quite realistic.

The stage is now set for the determination of firm behavior. A solution is found in the theory of the zero-sum two-person game as originally developed by von Neumann and Morgenstern. The game is two-person, because duopoly is the only case considered by Richter, and it is zero-sum because of a neat little trick. A's result of the game is defined by Richter as A's revenue *minus* B's revenue, $r_A - r_B$. B's result is defined as $r_B - r_A$. Under the set industry price, industry revenue $r_A + r_B$ is constant; call the constant K. Then $r_A - r_B = 2r_A - K$, from which we can see that what maximizes r_A will also maximize $r_A - r_B$. Likewise it can be seen that what maximizes r_B will also maximize $r_B - r_A$ or, which is the same thing, minimize $r_A - r_B$.

Hence the profit maximization game is zero-sum, for under constant price and constant per-unit cost of production and selling what maximizes revenue also maximizes profits.

Richter now introduces the assumption of perfect information in the strictly technical, *i.e.*, von Neumann-Morgenstern sense. This means that each player who makes a personal move is perfectly informed about the outcome of the choices of all anterior moves by his adversary. Van Neumann and Morgenstern, as we know, have shown that in games in which perfect information prevails, permanently optimal, pure strategies exist. Disliking the mixed strategies, Richter is very fond of this result. It permits him to reach a purely objective solution of his problem. No estimates of probabilities of rival action, no reaction curves, no attempts to find one's adversary out!

Apart from the maximization-of-industry-revenue procedure, where the reader may be pardoned for remaining unconvinced, Richter is correct within his own assumptions. But how narrow are the confines of those assumptions? Imagine a game in which every move requires careful and time-consuming preparation and, consequently commitment long in advance. Perfect information is ruled out by the very nature of the game, and there is a high premium on finding out the adversary. Suppose the German High Command had found out the time and place of the Normandy invasion, or the Allied Command the time and place of the Battle of the Bulge!

When facing a situation like this, the theorist can do two things. He can face reality squarely and come out with a subjective rationality. Or he can insist upon objectivity and refuse to admit any phenomenon which could play havoc with his assumption of perfect information. In oligopoly, one such phenomenon is product-quality variations, for they require research, designing, production engineering and tooling-up; in short they require commitment far in advance. Although he emphasizes the nonprice variables, Richter refuses to consider the quality of the product as a variable. The exclusion of quality variations is defended in the interest of "the exactness of our analysis."

As an exercise in objective and exact solutions, and as one of the few applications of the theory of games to oligopoly, Richter's book is useful, not the least because it clearly reveals the frightening height of the price that must be paid for objectivity and exactness.

Hans Brems

University of Illinois

Economics and the Public Interest. Edited by Robert A. Solo. (New Brunswick: Rutgers University Press. 1955. Pp. xiv, 318. $5.75.)

This is a collection of twenty essays, plus a short preface by Arthur F. Burns, contributed by former students and colleagues at Rutgers University to mark and honor the seventy-fifth birthday of professor emeritus Eugene E. Agger.

As is almost inevitable in a collection of this kind, the offerings are of uneven merit. Most are clearly written. Several are spirited. But only a few create a lasting impression.

The longest and most likely reference article is by Geoffrey H. Moore, entitled "The Diffusion of Business Cycles." Dipping into the National Bureau's informational stores he presents percentage "diffusion" measures which register the number of industries expanding and contracting. Finding that these indexes lead other measures of aggregate activity, Moore suggests that they ought to "contribute to a proper timing of measures taken to . . . promote recovery" and "they may be helpful in appraising the efficacy of such measures" (p. 58).

In a more provocative piece, on "Rain Making and Monetary Policy," Anatol Murad contends that advocates of monetary controls are indulging in magical dreams. Examining four recent reports he observes that in each case "the writers . . . recognize the failure of monetary policies, yet blandly urge greater reliance upon such policies" (p. 147). Even if his position is overstated, his evidence is of interest.

In a deterministic setting Leopold Kohr ("Economic Systems and Social Size") argues that "if a community is either too small or too large" then "the only possible system is . . . a system of discipline, direction, control. Economically speaking, this means socialism" (p. 208).

A clear position and a fast pace characterize "Colonial Experience and the Social Context of Economic Development Programs," by Harry D. Gideonse. Citing Indonesia, for "its recent history demonstrates so eloquently the hollowness of the usual 'anti-colonial' cant about unilateral exploitation" (p. 250) he attacks the proposition that freedom and advance can be transplanted "by a flow of financial grants matched with a vague desire for material improvement" (p. 257). In contrast Broadus Mitchell ("The Poverty of Economics") holds: "We are at this instant reaping the bitter fruits of imperialism and colonialism." Through free trade, which was merely a "British axiom," other peoples "were repressed . . . into primitive production and lopsided development" (p. 31).

The opening essay is an arid methodological item by Solo on "Economics as Social Philosophy, Moral Philosophy, and Technology," which particularly violates his editorial canons on "significance and clarity." A more lucid note by William C. Bagley, Jr., on "The Task of Institutionalism," chastizes economics for neglecting "culture" though he does not show how the new institutionalism transcends the old. He suggests that theory will disappear when "everyday experience" is studied (p. 21). Occupational unemployment for the theorist is not a new forecast.

Broadus Mitchell thunders in lively scorn and wrath at friend and foe. His range encompasses the classicists, diminishing returns, formal convention papers, academic stock-market forecasters, Keynes in academic gown, Keynes in business suit, Keynes the Judas-goat, politicians, scholarly journals, mathematics, model builders, compensatory finance, full employment, colonialism, etc. He is reassured though that "economics, after all, is not a science but an art . . ." (p. 29). And he reveals that to "turn the gross mass of poverty, ignorance, disease and death into the gold of peace, plenty, and progress" involves "no secret beyond good-will and good judgment" (p. 30).

In a modest statement on "Marketing's Contribution to Economics," R. S. Alexander queries whether a price reduction leaves the demand schedule

unchanged, suggesting that expectational forces may engender a sales decline. These dynamic relations are too frequently ignored. Also, he avers that demand inelasticity (in the neighborhood of accustomed price?) is more common than usually supposed. And he rightly criticizes the extensive preoccupation with a single-product firm.

Sidney I. Simon offers a useful survey of accounting and legal definitions in "Profits, a Semantic Problem Child" and J. Wilner Sundelson, a specialized study of "Forecasting Automotive Sales." Ridgeway Hoegstedt ("Economics and Accounting") wells with pride in reiterating that "accounting is essentially a consensus" of standardized conventions. This he regards as virtue enough. His gentle, scholarly rejoinder to economists is that they "have urged that it [accounting conventions] be replaced by a body of controversy resting on linguistic confusion" (p. 118). His profound, pontifical advice to economists is that "the subject matter of economics is not mechanism, but mankind" (p. 119).

Alexander Balinky covers "Public Finance and the Public Interest," Monroe Berkowitz, with some good insights on the union shop, develops "Public Policy and Union Security," Lawrence Knappen outlines "Managerial Zones of Reasonableness in Public Utility Regulation," and Max Gideonse examines "The Development of International Commodity Policy." Reviewing price stabilization programs, Gideonse decides "that the inherent defects of government control schemes normally outweigh the defects of the free market . . ." (p. 225).

David A. Morse devotes "International Employment Problems and Policy" substantially to the work of UNESCO and the ILO. Kenneth Kurihara follows Harrod's path in a brief coverage of "Growth Theory and the Problem of Economic Stabilization." Robert J. Alexander elaborates mainly some British and Russian history in considering "Who Bears the Cost of Economic Development?" Finally, Roland R. Renne closes with "Land Tenure Reform as an Aspect of Economic Development in Asia." Economic theory today, compared to the older tradition, perhaps pays too little attention to diverse rental methods as an influence on allocational efficiency.

Amid this assortment, and almost in the very middle of it, Milton Friedman has a paper on "The Role of Government in Education," concerned not with the content, nor facilities, nor recruitment of educational personnel but instead with a proposal to separate the financing and administration of education. It is surprising to learn that elementary education is a "nationalized" industry. In Friedman's scheme: "Government could require a minimum level of education which they could finance by giving parents vouchers redeemable for a specified maximum sum per child per year if spent on 'approved' educational services" (p. 127). Doing so, "Government would serve its proper function of improving the operation of the invisible hand without substituting the dead hand of bureaucracy" (p. 144). Though he properly abhors racial segregation, the same anxiety for freedom, this time of those who *choose* segregated schools, enables Friedman to see a saving grace in the plans of some Southern states to abolish the public school system.

SIDNEY WEINTRAUB

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Theorie der allgemeinen Volkswirtschaftspolitik. By HANS-JÜRGEN SERAPHIM. (Goettingen: Vanderhoeck & Ruprecht. 1955. Pp. 351. DM 30.-; cloth DM 33.-.)

The American reader may find the title and the structure of this book somewhat puzzling, if he does not relate them to the typically German approach of the author. For more than a century, German economists have stressed, in their thinking, their research and their teaching, a systematic distinction between the theory of economics and applied economics. They gradually developed the latter into a self-sustaining discipline of economic policy, and in due time they proceeded to divide this new discipline into general and specific parts as well as to bolster it with a theoretical foundation of its own—hence their "theory of general economic policy." It is rather difficult to draw any clear-cut borderline between this theory and the theory of economics. However, decades of professional experience and skillful handling of systemological intricacies have helped the author to overcome some of the obvious difficulties concerned. His efforts have been facilitated by two characteristic attitudes. In a traditionally German way, he explicitly emphasizes the methodological aspects of economic policies and consistently inquires into their sociological background.

Accordingly, the first part of the book is devoted to a reconsideration of relevant old and new methodological debates. The outcome is a series of analytical refinements pertaining to the permissible scope of theoretical abstraction, to the issue of value judgments, to up-to-date model building, and to the bearing of these refinements on the relation between theoretical and applied thinking in the domain of economics. The author's rejection of catallactic economics of the pure exchange-theory pattern as a sufficient foundation of economic policies leads him to an examination of the essential social factors involved.

His sociological appraisal of these factors, which represents the core of his achievement, is concentrated on the phenomenon of economic power as well as on the basic forms of economic organization, respectively treated in the second and third parts of the book. Among the strategic conditions of effective economic power, he successfully analyzes the required personal qualifications and purchasing power, and he adds illuminating remarks on some of the related functional aspects of social structure and economic equilibrium. His morphological comments concerning the basic forms of economic organization reveal the effects upon the market resulting from the development of the tribe, family, medieval feudal and corporate ties, modern private enterprise, class stratification, and economic collectivization. He then makes a stimulating attempt to explain such effects in terms of the historical epochs of economic policies.

The fourth part of the book deals with the subjects, ends, tasks, means and "systems" of economic policies. Most likely, this part could have been profitably expanded even if it were at the expense of the three preceding parts. In particular, it would have been useful to elaborate further on the relationship among the economic categories of "systems," "orders," "proc-

esses," and "fundamentals" determining the over-all goals of economic policy. Nevertheless, it is fair to add that such categories have been abundantly discussed in the economic literature of German-speaking countries; that the author has contributed to the clarification of several relevant penumbrae; and that it would have been beyond the scope of his "general" theory to penetrate specific problems of applied economics.

Possible improvements in the book may be suggested: First, some of the methodological classifications are too rigid. For example, the distinction between economic policy and economic guidance (pp. 326 ff) and the enumeration of seven models reflecting "systems of economic policy" (pp. 334 ff.) should be relaxed and more directly referred to what is usually meant by economic systems. Second, some of the essential theorems should be refocused in order to include more convincing arguments. For instance, the analysis of individual and collective wants (pp. 241 ff.) should be reconsidered in the light of such intermediate cases as relative and absolute social wants, common wants and group wants. The application to economic policies would then be more plausible and efficient. A somewhat similar result could be achieved by reclassifying the five means of economic policy (pp. 300 ff.) and by shifting their emphasis toward empirical differences in the degree of governmental intervention. Third, although it is undoubtedly justifiable to stress the qualitative factors of economic policies, the concomitant quantitative factors and their analysis should also be given adequate attention.

All in all, this book offers a substantial contribution to several neglected chapters of economic methodology and systematology. Especially valuable are its frequent references to the historical development of the doctrines expounded. The author's excellent coverage of recent German economic literature in itself would warrant an English translation.

THEO SURANYI-UNGER

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Kapitaltheoretische Untersuchungen. By WALTER EUCKEN. 2nd edition, enlarged by 3 essays (Tübingen: J. C. B. Mohr. Zürich: Polygraphischer Verlag. 1954. Pp. xxvii, 336. DM 18.80.)

This volume reprints the *Kapitaltheoretische Untersuchungen* first published by Walter Eucken in 1934. Eucken follows Böhm-Bawerk in basing his interest theory on the productivity and scarcity of capital. In common with the Swedish followers of Böhm-Bawerk, such as Wicksell and Akerman, Eucken frees his analysis from the discount idea that interest reflects a low valuation of future as compared with present goods. He rather stresses the higher productivity of production through time. Interest appears as the payment for the services of capital which permit more time-consuming and therefore more productive processes; it is determined by the general equilibrium of the economy. Böhm-Bawerk toward the end of his *Positive Theory* had already discussed interest in a general equilibrium setting under the simplifying assumptions of only one productive agent and a single product.

Wicksell developed the theory of interest with more than one productive agent and several final products. Eucken considers the production of consumption as well as capital goods and adds the idea that the nature of all inputs changes with a shift in the time period of production.

Though Eucken explicitly recognizes the production of capital goods, he treats the total amount of productive agents as a given constant and thus appears perhaps the last exponent of a "stationary" interest theory. In later essays reprinted as an appendix to the present volume, and in unpublished notes left at the time of his unexpected death in 1950, Eucken attempted to push beyond the limitations of static analysis. Following Hayek, he gave up the idea of an average production period. Under the influence of Keynes, he recognized the role of monetary factors in the determination of the interest rate. Stimulated by his student Lutz—who has contributed a masterly introduction to the new edition—he concerned himself with the structure of interest rates. All this was leading Eucken from static interest analysis toward the search for a more dynamic theory of capital formation and of the economic development which distinguishes succeeding investment periods.

The *Kapitaltheoretische Untersuchungen* may not add much to the main body of economic theory. Yet they stand out as a valiant contribution to rational economic analysis at a time and place given to emotional propaganda rather than rigorous theory. When first published in the Germany of 1934, Eucken visualized his work as the beginning of a new series on "problems of economic theory" and prefaced it by an inquiry on "what does economic theory contribute?" It is this introduction on economic methodology which established Eucken as the great teacher who preserved the tradition of economic reasoning through a decade of totalitarian dictatorship and who prepared his students to help in the re-establishment of a free German economy.

WERNER HOCHWALD

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Public Policy. A Yearbook of the Graduate School of Public Administration, Harvard University, Volume V. Edited by CARL J. FRIEDRICH and J. KENNETH GALBRAITH. (Cambridge: Graduate School of Public Administration, Harvard University. 1954. Pp. viii, 420. $5.00.)

This book contains a variety of papers without central theme or unifying organization plan. It opens with the text of a lecture by Eugene Meyer, substantially devoted to reminiscences of his diversified experience in the federal service, including the management of prices in World War I, the War Finance Corporation, the Farm Loan Board, the Federal Reserve System, and the Reconstruction Finance Corporation. Part II presents two case studies of antitrust policy, one dealing with the International Business Machines Corporation and the other with the textile machinery industry. Part III contains three papers under the general heading of Planning and Resources Policy: one on watershed flood control, the second on planning research for defense, and the third on the formulation of economic policy in postwar France. Part

IV—Fiscal and Monetary Policy—offers the following assortment: "Monetary-Debt Policy Revisited," "The New Monetary Policy," "Some Aspects of Family Allowances and Income Redistribution in Canada," "The Canadian Exchange Rate," "The Limits of Taxation," and "The Income Tax of France." In Part V are found two papers on Legislation and Parties, one on "Congress and the Fair Deal" and the other on "Party and Separation of Powers."

The usual comment on quality range in such a collection is in order. Contributors include graduate students and senior professors. In appraising a pudding concocted from such mixed ingredients, the reviewer's useful function is to identify the choice plums and hold his peace for the rest.

The most interesting papers are those by Preston on the textile machinery industry, Houghteling on the French income tax, Peret on the limits of taxation, and Musgrave on monetary-debt policy.

Preston's study suggests that the disposition to transfer antitrust policy from a foundation in abusive and predatory practices to a foundation in market power offers an adventure in uncertainty. Since 1920 the textile machinery industry has seen the number of firms producing a full line of cotton preparatory machinery decline from nine to two, the number of loom-makers from five to two. Yet all the normal monopoly tests indicate ambiguous results: in overt restraints on trade, in measures of industrial performance. The intriguing implications of performance in what should be a classic arena for monopolistic manipulation urge the extension of such industry analysis before we are too far committed to the superficially attractive economic concepts as a satisfactory substitute for the traditional legalistic approach to antitrust problems.

Houghteling's study of the French failure to establish effective and equitable income taxes concludes that the root of the difficulty is not a dearth of ideas for reforming the tax structure, but a distribution of political forces that impedes constructive action. In contrast to the tendency in nations with relatively advanced economic development to rely heavily on income taxes, in France income taxes have never produced more than one-fourth of the central government's tax revenues. The aggregative tax burden is heavy, is slightly but irregularly progressive, and is in no sense archaic. The system's principal influence is toward perpetuating characteristics of the French economy that act as drags on economic development. Those with a vested interest in these characteristics are sufficiently powerful to compel policy compromises that fail to convert the tax system into a force for economic progress.

Peret begins with Colin Clark's thesis on the critical limit of taxation. He observes a lack of consistency between the hypothesis of the critical limit and its statistical underpinning. From a review of taxation and economic performance he concludes that taxable capacity is a variable responsive to national resources, their level of utilization, the level of technological development, and the rate of general economic growth. There is no record to support the proposition that the level of taxation in the United States has contributed to either adverse effects in the area of economic development or to inflation.

Musgrave undertakes a reconsideration of the monetary-debt-unemployment-inflation complex with emphasis on removing false issues created by attempting to convert incomplete analysis into policy criteria. This leads him to two conclusions. The first is that monetary-debt and fiscal restrictions are related, not independent, tools, and therefore require resolution within the framework of a general stabilization policy. The second conclusion suggests that the nature of this resolution—the "product mix" of monetary-debt and tax measures—may contribute to important differences in results. These are found in income distribution, in resource allocation, and ultimately in the rate of economic growth.

MELVIN ANSHEN

Carnegie Institute of Technology

Economic History; National Economies; Economic Development

Approaches to Economic Development. By NORMAN S. BUCHANAN and HOWARD S. ELLIS. (New York: Twentieth Century Fund. 1955. Pp. xiv, 494. $5.00.)

Underdeveloped areas are backward in more ways than one. The lack of capital accumulation not only is not the whole story, it is no more prominent that the backwardness of social institutions, cultural attitudes, personal habits and aptitudes, and the bureaucratic inefficiency of governments. A good introductory book on the development of such areas should begin not with growth models and other elaborate machinery, but with the empirical contents of the subject—the characteristics of the people and their institutions, and policy problems expressed in the form in which they present themselves in backward areas. Capital accumulation can be given a central position, but not one that eclipses the less tangible problems.

Ellis and Buchanan have written such a book, and written it well. One pays a price for it; the result is not exciting reading, it is quite untheoretical reading, with no original machinery of analysis and no new program, and often concerned with organizing the obvious. Even the original ideas do not seem original, since they must be on a low level of generality and somewhat mundane in their contents. The result is an excellent text for students but a chore for economists. It is a rewarding chore, but not in intellectual stimulation.

The book could have been somewhat more exciting, and the better for it. Omission of repetitions would have saved space for more advanced sorties; and parts of the book would have been improved by abstract models. Some Malthusian models would have helped the discussion of population; and the treatment of inflation, investment, income growth, and balance of payments could probably have been made more rigorous and less ambiguous without belaboring multipliers excessively. But the purpose of the book is mainly responsible for its lack of climax and stimulation; and the purpose is a proper one.

The scheme is good. Part I, 116 pages, introduces the characteristics of underdeveloped countries, discusses resources and their use in relation to per

capita income, and then gives three chapters of equal weight to capital accumulation, social and cultural factors, and demographic factors. Part II, 115 pages, contains brief histories of the economic developement of England, Japan, France, Germany, and the U.S.S.R., and an historical summary. Part III, 232 pages, is on contemporary problems and policies: development of agriculture, of commerce, of industry; saving, financial institutions, government finance; foreign trade; foreign capital; assistance program for underdeveloped countries; and a chapter on the interests and responsibilities of the United States. For class use Part II could be taken first, last, or where it is, or left out, without disturbing the organization. The reviewer's first inclination was to leave it out, as insufficiently productive of easily transferable policy conclusions; on reflection he is persuaded that its provision of "perspective"—which was the authors' main purpose for it—earns it a firm position somewhere in the book.

The book is least satisfactory where it is most theoretical. The role of capital in production and income generation leans excessively on the concept of factor *proportions* in Chapter 2, and at several points (pp. 42 and 47) seems to confuse income with real wages and to ignore the return on productive assets. For example, "If labor were completely substitutable for land and capital equipment in production, then the dearth of land and capital relative to labor in the underdeveloped areas would make no difference: output per person could be just as high as in the high-income countries" (p. 42). Thus, even though the authors preface their remarks on labor and its productivity with the statement that "unlike land and capital, human beings are at once a factor in production and the end purpose of economic activity," they do not avoid the analytical pitfalls involved. They do, however, avoid a lot of other pitfalls, especially the obstinate one about all differences in labor productivity among countries being due to the quantities of land and capital available; and for their excellent discussion of social, cultural, and personal differences among workers and their productivity they deserve congratulations.

The treatment of inflation is ambiguous. The implicit criterion for fiscal stability seems to be something like constancy of the ratio of money to income (pp. 308, 312, for example) but the implications of this criterion are not carefully handled. There is a hint or two (pp. 308, 312, 388) that noninflationary investment is investment that leads to "an equal flow of marketable product," but this concept has no meaning except in an explicit time-sequence analysis. A number of statements on fiscal stability depend on unstated premises—statements about the comparative inflationary effects of government deficits vs. private deficits (p. 312), commercial bank loans vs. other forms of financing (pp. 307-8), the inflationary effect of capital inflow (pp. 388, 398), and the "income velocity" multiplier (p. 388). With a little thought one can usually provide the particular premise that makes the statement understandable; but the effect on students will be confusion.

Other deficiencies—mentioned here to advise, not to discourage, the user of the book—are: inadequate attention to the exchange rate in discussing the "productivity" criterion for allocation of investment; undue identification of the "productivity" of foreign capital with the specific imports financed by

the foreign exchange (pp. 391-92); similar identification of a country's capacity to service foreign debt with the specific investment projects financed by foreign loans (pp. 394, 398); the absence of systematic discussion of whether the "unseen hand" of the price system and profit motive is, in principle, an ideal allocator of investment, *i.e.,* whether private and social productivity can be identified with each other; insufficient attention to the influence that income distribution objectives will have on the allocation of development among the industries and areas within a country; and a neglect of the critical question of the appropriate rate of capital accumulation (in a time-preference, social stability sense, rather than a fiscal-monetary one) except where the authors use this topic to divide economists rather ruthlessly into two comprehensive schools of thought.

A reviewer can pick faults endlessly from a book that tries to lay an elementary groundwork; the present book has the usual share of deficiencies of a good text, not more. The footnoting is excellent; for people either teaching a course, or briefing themselves on the rudiments of the subject, it supplies a well selected reading list parallel to the text.

As remarked above, the book is not much fun, and probably was not for the authors either, since they had to discipline themselves on nearly every topic. The reviewer, who shares the authors' prejudice on how to approach the subject, thinks the result well worth the labor.

THOMAS C. SCHELLING

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Economic Development—Principles and Patterns. Edited by HAROLD F. WILLIAMSON and JOHN A. BUTTRICK. (New York: Prentice-Hall. 1954. Pp. xii, 576. $6.75.)

"Underdevelopment" has reached the textbook stage. Since the war, the problems of the less developed countries have occupid a prominent place in economics. Once the great debate about monetary and fiscal policy and about the dollar gap had blown over, no other field in economics, it is probably fair to say, has been so fruitful in new ideas as that of development. Here the discussion is still very much in flux. It is gratifying to think that enough systematic material has accumulated to encourage some bold spirits to write a book addressed chiefly—not exclusively—to college students.

It is not possible, in the framework of this review, to do full justice to all the contributions, but some of the outstanding ones deserve special mention. Harold Williamson opens the book with a thoughtful essay on the meaning and measurement of development. Here the reader finds all the questions, and probably some more, that may have worried him as he contemplates the current developmental scene. J. Spengler contributes an interesting essay that opens up the whole range of population problems. His bold speculations with concrete magnitudes are intriguing, as always. John Buttrick's chapter on capital formation represents, for the analytical point of view, the heart of the book. Nevertheless, I doubt that the casting of familiar propositions into new diagrams, however skillfully done, is of real help to the often broadly

diversified group that meets in development courses, variously known as an interdisciplinary cross-section or motley crew.

Yale Brozen's extremely interesting piece on entrepreneurship and technological change deals with the two analytically and statistically most baffling subjects in the whole field. Here we find the chief discussion in the volume—and only too short—of alternative directions of development. He also suggests methods for stimulating the supply of entrepreneurship, which he regards not so much as a problem of creating the spirit as of removing barriers.

The chapter on cultural factors by Francis L. K. Hsu has much to say that is fascinating to the economist. Hsu sees the source of Western economic pre-eminence in the sense of insecurity that stems from Western individualism. If the various doubts that this theory raises can be resolved, it may have many fruitful implications.

The three closing chapters on individual countries are all excellent. Each demonstrates a different aspect of development. Irene Taeuber, writing on population growth in Japan and Korea, gives the clearest account I have yet seen of the impact of industrialization upon population growth. Helen Lamb describes the immense problems besetting India's economic development. Henry Aubrey analyzes Mexico's rapid growth. Rising inequality of income, allowing a high rate of capital formation, seems to have been an important causal factor.

The book as a whole shows that the field of economic development has not yet shaken down to anything like the well systematized—and somewhat deadening—organization encountered in many other branches of economics. Wide differences of view are to be expected as to what belongs, and where. The present volume has the virtue of a broad-gauged approach, in addition to containing many valuable contributions. On the other hand, it does not deal with any of the general growth theories, nor does it take cognizance of the important current debates, stirred up by the ideas of Prebisch, Singer, Rosenstein-Rodan, and many others. In particular the book is short on policy.

In consequence, it is not easy to tell from the volume exactly where developmental economics stands today—except that it seems to be entering the textbook stage. Some years ago, development theory seemed to be in a phase somewhat analogous to the early stages of Keynesian economics. Much of the theoretical equipment evolved in advanced countries was being rejected as inapplicable to the less developed areas, and, as in the early Keynesian phases, a new economics was being demanded. Some bold and revolutionary ideas came to the fore at that time. Today there seems to be less inclination in development thinking to emphasize the novel and the extreme. There is less of a tendency, for instance, to identify development exclusively with industrialization. The belief in the effectiveness of inflation as a vehicle for development seems to be waning. Perhaps—though this is doubtful—one may discern a somewhat more liberal attitude toward international trade and foreign investment.

It seems also that the pessimism connected with the earlier belief that capital-output ratios for underdeveloped countries were very high, and that very large amounts of capital would be required to achieve a modest degree of development, has yielded to often rather optimistic assumptions. The capital-output ratio as an instrument of developmental thinking and planning has found wide acceptance, sometimes perhaps a little uncritically. The population problem is beginning to be viewed as amenable to policy, and not as subject solely to uncontrollable social and biological forces. Finally, there seems to be less interest in general theories of development and more in detailed analysis of specific problems, though the hope of finding the philosopher's stone of a really universal theory no doubt springs eternal.

Such are the year-to-year issues that are hotly debated for a while and then often laid aside. Of them our volume takes little cognizance. Perhaps that is the part of wisdom in a book that is not intended to be rewitten every two years. It is to the understanding of more permanent problems that the Williamson-Buttrick volume makes its contribution.

Henry C. Wallich

Yale University

The Economic Future of Canada. By H. M. H. A. van der Valk. (Toronto and New York: McGraw-Hill. 1954. Pp. 206. $4.75.)

This book was originally written in Dutch by a distinguished Dutch economist in order (as he says in the foreword) ". . . to share a stimulating friendship with [his] own countrymen—many of whom have set out to make their home in a country of which they had only vague impressions." The Canadian edition proceeds to do just this for a much wider readership.

The initial chapters describe the essential characteristics of the Canadian economy in the usual order—the frontier, the population, national income, the resource pattern, industry and transportation. The blossoming growth floodlighted in these early chapters is then analyzed in fuller macro-economic terms—international trade, capital movements, investment and monetary policy. The culminating pages make some broad and perfectly acceptable projections into Canada's economic future.

The descriptive chapters provide an excellent compilation of generally available data in brief, well-organized, and readable style. The analytical section operates within an outline of the Canadian financial institutions, trade structure and public policy. To both parts the European observer brings, at intervals, a fresh awareness of things North Americans sometimes neglect because they are, though extremely important, extremely commonplace. For example: "The European coming to Canada and the U. S. is generally impressed by the large amount of productive work done voluntarily. For this reason the Europeans have a wrong idea about the five-day week. The so-called 'free Saturday' is for many one of the busiest work days of the week, a day of work for themselves" (p. 169).

Constructive criticism can be aimed on two levels. For the uninitiated, "beginner" on Canada, the initial chapters on the frontier and the resource

pattern would have far more meaning if they were projected against a broad framework of the geography and geology of this tremendous region. Moreover, at least to the North American reader, resource development hinges much more emphatically upon public policy both on the national and the provincial level than the European writer perceives. Likewise, a great deal more light could be shed on developing Canadian economic (and broader) policy had there been a clearer statement of the role of the French-Canadian. (Bilingualism is not merely an interesting cultural phenomenon.) One or two points on a lower level undoubtedly reflect the problems encountered in distilling a tremendous subject. Discussing transportation, the author concentrates on the St. Lawrence seaway (with an adequate supply of the by-now familiar diagrams and maps). In effect, a newly groomed tail wags an important dog. Canada's transportation picture is complex. Not least important is the leading role in contemporary expansion played by the country's historic overinvestment in railroads. As a by-product of this, the author may contribute to the impression that Ontario province is an area rich in hydro-electric power. Niagara redevelopment and Ontario's share of St. Lawrence power notwithstanding, power in the future of the eastern region focuses attention on Quebec and Labrador (a sector often eclipsed by the glamor of the Yukon and Northwest Territories' development).

In passing, it may also be difficult for the student of the Canadian economy to accept the relatively minor role given to the United Kingdom's historical position in both financial and entrepreneurial capacities. The modern, independent stature of Canada and the current influx of capital from the United States should not cast a shadow over the real and (even presently) substantial British contribution to the Canadian scene.

Professor van der Valk has made good use of a significant part of the fine array of material now available on Canada and, all things considered, has done very well in condensing encyclopedic information in two hundred pages. Given the present level of ignorance among American college students as to the Canadian economy, the book should find a wider readership than it probably will. To those who do read it, the book's few, well-chosen footnotes will open excellent doors for further reading on Canada.

On the whole, the reviewer feels this is a useful introductory volume on the Canadian economy despite the blemishes undoubtedly induced by the pressure for brevity.

FRANK A. FARNSWORTH

Colgate University

A Report on Monetary Policy in Iraq. By CARL IVERSEN, assisted by P. WINDING and P. N. RASMUSSEN. (Copenhagen: Ejnar Munksgaard Pub. 1954. Pp. 331.)

Professor Iversen joins the growing ranks of Western academicians whose advice has been sought by governments of underdeveloped countries, and gives a highly readable analysis of financial aspects of the development of Iraq. Prepared at behest of National Bank of Iraq, the report is concerned

with monetary policy in its wider sense (*i.e.*, credit, foreign exchange, fiscal, and investment policy).

Iraq, oil-rich, relatively underpopulated, but poverty-stricken, launched a developmental program in 1950 as much from the pressure of expanding oil royalties as from the basic desire of raising living standards. Iversen considers the ideal rate of expansion as one which proceeds as rapidly as consistent with avoidance of inflation and maintenance of adequate exchange reserves; and he analyzes alternative courses of development. The reader is run through a Keynesian gauntlet of autonomous investment, induced effects, one-shot and continuous doses, marginal propensities, closed and open multipliers, accelerators and endogenous cycles. Whether the desired pace is maintained depends further on reaction-time lags, producer expectations, and inventory policies. The way may also be littered with supply bottlenecks (*e.g.*, shortage of skilled manpower and entrepreneurship). If local bottlenecks become generalized, development is retarded and cumulative wage-price inflation threatens. However, the reader is reassured, Iraq enjoys a unique advantage over other underdeveloped areas in its relatively large foreign exchange reserves. This permits it to plan for development without fear of balance-of-payments adversities, and to combat inflation by calling upon foreign supply sources.

Having analyzed the situation of an underdeveloped area exposed to "advanced" ailments, the report considers the applicability of "modern" remedies. Credit policy is hampered by institutional obstacles (*e.g.*, domination of money market by foreign banks and absence of a capital market). Even if these were overcome, Iversen doubts whether credit policy in itself would be effective in containing generalized inflation. Fiscal policy is similarly found lacking. This leaves it up to the Development Board to plan its activities so as to balance approximately available supplies and total demand. Finally, Iversen considers whether Iraq should leave the sterling area in an attempt to preserve the purchasing power of its foreign-exchange assets and concludes that no clear gain would result, unless sterling becomes convertible or Iraq significantly increases its dollar earnings. Since neither possibility seems realistic at present, the country should concentrate on improving its bargaining position within the sterling area.

It may be questioned whether the analytical apparatus employed comes to grips with currently, rather than potentially, relevant problems of underdeveloped areas, and whether sufficient attention has been paid to longer-term institutional adjustments necessary for effectiveness of modern policy prescriptions.

SHELLEY M. MARK

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Indian Village, By S. C. DUBE, with foreword by M. E. Opler. (Ithaca: Cornell University Press. 1955. Pp. xiv, 248.)

"Instability" in the industrial labor force of underdeveloped countries is assumed to interfere substantially with the effective allocation of human

resources in a country developing its industries. High rates of absenteeism and turnover, low rates of labor productivity, poor work habits, plant indiscipline are all phenomena associated with a work force recently settled in industrial centers. Most students trace the lack of worker "commitment" to the workers' hybrid affiliations, partly industrial and partly agricultural, to the "village nexus." It is argued that new industrial workers are often unable so sever the umbilical cord that ties them to the village. As industrial workers they appear motivated by the mores of the village rather than those of the city. They are "in the city but not of the city."

Study of the socio-economic structure of villages in underdeveloped countries has a place in the study of economic development even if one rejects the "village nexus" hypothesis. After all, the majority of the economically active population of most underdeveloped countries is to be found in villages. It is there that underemployment and unemployment is most marked and it is in the villages that economic and social growth is to make its greatest strides.

Dube's *Indian Village* provides the student of economic growth in underdeveloped countries with an excellent base line study of the social and economic life of a villager.

Shamirpet is a village of less than 3,000 people located about twenty-five miles from Hyderabad, in South India. Although the author claims no particular typicalness for it, Shamirpet possesses characteristics common to most rural communities in India. In its economic constitution Shamirpet shows features present in the villages of most predominantly agricultural countries. All aspects of village life are surveyed to ascertain to what extent social, economic and political changes currently taking place in India and the world are affecting it. Changes in the role of the family, the caste, the village council are reported with clarity and in language void of narrow professional jargon. Much emphasis is placed on the nature and change of ritual and on the web of family ties; yet at least 105 pages of the 235 pages of the text deal directly with the economic structure of the village.

Dube provides the reader with an occupational breakdown of the total population. The dependence of the great majority of the population on the productive activities of the few (only 336 people find full-time employment and produce the food consumed by the village); the extremely small number of people engaged in activities not connected with agriculture (only 331 persons find occasion to work in areas other than agriculture and of these 90 are government servants); and the very high level of underemployment—all characteristic of the economy of underdeveloped countries—come vividly to the reader's attention.

Land distribution as well as that of other assets is discussed. So are the complex exchange relationships which show the carry-over of traditional division of labor and the role of caste.

Shamirpet is no isolated center of the hinterland, being connected to the capital by no less than 12 busses which go through the village every day. Nor is the village economically independent: "the economy of the village is only partially self-sufficient" (p. 87). Consumers and producers goods (the weavers' spindles) are imported from the nearby capital. Labor is exported

in the trickle of workers that bicycle to the capital to look for employment as often as to go to work. Precisely in the analysis of the village dependence on the rest of the world lies the book's importance. Dube notes that: "For over a century 'the timeless and changeless Indian Village' has been the ideal of the romanticist" (p. 212).

Changes that had been in the making in the last seventy-five or a hundred years and which became more marked after 1948 are looked at in detail. Although much concerned in social changes the author finds that most are traceable to changes in the "material culture and technology" and argues from the readiness in accepting earlier changes that "it is justifiable to predict that given suitable conditions the tempo of change would greatly increase" (p. 235).

The economic situation of present-day India whose rapid economic development has surprised many Indian and Western economists is made to hinge on the rapid "spreading of the market." For an understanding of the phenomenon, in real terms, ***Indian Village*** is a must for the student of economic development.

Oscar Ornati

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Statistics and Econometrics

Linear Aggregation of Economic Relations. By H. Theil. Contributions to Econ. Analysis VII. (Amsterdam: North-Holland Publishing Company. 1954. Pp. xi, 205. $5.00.)

Aggregation theory is concerned with the relations between microtheory, macrotheory and aggregation procedures. Such procedures are constructed as definitions of macrovariables in the form of functions of a specified group of microvariables. Earlier studies in this field by Klein, Shou-Shan-Pu, and May established and discussed three distinct problems: (a) to determine aggregation procedures consistent with a postulated micro- and macrotheory; (b) to specify a macrotheory consistent with a postulated microtheory and postulated aggregation procedure; (c) to determine a class of microtheories consistent with a postulated macrotheory and specified aggregation procedure. For quite a number of years aggregation theory was neglected even as a few contributions were made on special topics in input-output analysis. The present book by a Dutch econometrician revives the discussion. It should be emphasized that a further investigation of the problems in the field is certainly required, *e.g.*, existing macrotheory contains relations between macrovariables which are inconsistent with generally accepted measurement procedures of the variables involved. Such a further investigation is contained in this book, and let it be immediately stated that it is a well organized and clearly executed analysis. The author restricts his problem in two general directions: (a) he considers essentially linear models and linear aggregation, *i.e.*, the case where macrovariables appear as linear forms of microvariables, and (b) by the particular choice of procedure for deriving relations between the micro- and macrostructure of a given class of phenomena. This procedure

may be termed "statistical" to distinguish it from another possible approach. The various chapters of the book unfold the logic of the chosen procedure in a series of cases with rising degree of complexity.

After a general introduction the author discusses in three subsequent chapters three types of aggregation: aggregation over individuals, over commodities and over time. The theorems obtained indicate a close connection between the formal structure of the three types of aggregation. The essential features of Theil's analysis in these chapters can be summarized in the following way: Suppose there is postulated a set of microrelations connecting microvariables y_i with microvariables x_{jh}. Aggregation procedures are postulated: macrovariable Y is the sum (weighted or not) of the y_i and each X_j is the sum of the corresponding x_{jh} (with respect to h). Then it is postulated that the macrovariables are connected by a relation similar in form to the corresponding microrelations. The problem now is to determine relations between the parameters of the micro- and the macrostructure. For this purpose a new set of auxiliary relations is introduced, defining each of the microvariables x_{jh} as a function of all the macrovariables X_i. These relations have no economic meaning; they are introduced for "purely statistical" considerations. As a result of various substitutions and rearrangements we derive then the intercept-macroparameter as a sum of two components; the first component is the sum of the intercept-microparameters, and the second component is a multiple of the covariance between the intercept-parameters of the auxiliary regression and the slope microparameters. We obtain similarly the slope macroparameters as a sum of the average value of corresponding slope microparameters plus a term indicating a covariance adjustment, depending on the covariance between the slope-parameters of the auxiliary regression and the slope microparameters. Some important conclusions follow from this result. In general a macroparameter will depend on all the microparameters. Thus, a small macroparameter does not necessarily mean that the corresponding microparameters are small. A serious consequence of the "covariance adjustment" in the relation between micro- and macroparameters is the possibility of contradictions between micro- and macrotheories, *i.e.*, that the reaction patterns in endogenous variables relative to given changes in exogenous variables will differ in the two schemes. Further, due to the derivation by means of the auxiliary regression, the "covariance adjustment" depends on the observed values of the microvariables. This implies that the macroparameters may change in the course of time even within a constant environment of microparameters. And as long as the "covariance adjustment" does not vanish, the estimates of macroparamenters will depend on the statistical methods chosen. Considering these troublesome results it is therefore interesting to note that there exist aggregation procedures in the form of fixed-weight sums of microvariables which will eliminate the covariance adjustment. Consequently, for suitably chosen macrovariables, we find that the intercept macroparameter is just the sum of the corresponding microintercepts and the slope macroparameter just an average of corresponding slope microparameters. In Chapter 5 the author turns to a discussion of aggregating a *system* of microrelations into a *system* of macrorelations. Some of the techniques developed by the Cowles

Commission are used in the context, and this then permits an application of previously established results to this case. Given are again a microsystem, aggregation of micro- into macrovariables, and a macrosystem in a form similar to the microsystem. In a first step the reduced forms of the micro- and macrosystem are obtained. Previously established theorems can be immediately applied to these sets of reduced forms so that the parameters of the macroreduced forms become expressible in terms of sums of corresponding microreduced form parameters and some covariance adjustment. This makes the parameters of the macroreduced form dependent on the microstructure, and provided that the macrostructure is identifiable, the same property holds for every parameter of the macrosystem. Chapter 6 extends the results to a changing economy, *i.e.,* an economy with a changing number of individuals, commodities and changing microparameters. By means of a division into subperiods and an additional auxiliary relation involving the averages of the microvariables in each subperiod the former results can easily be extended, and the macrointercept and macroslope parameter appear as sums of weighted averages of certain other parameters. By a suitable choice of weighted aggregation the most troublesome features of aggregating within a changing microenvironment can be eliminated. Chapter 7 is devoted to an investigation of "perfect aggregation," which is defined in terms of absence of contradiction between micro- and macrosystems. Perfect aggregation prevails if the aggregation bias defined in terms of the covariance adjustments vanishes. There always exists a suitable choice of linear aggregation functions which will assure perfect aggregation. A concluding chapter summarizes the results and considers the relevance of aggregation analysis.

This compactly and clearly written book which exhibits a high degree of econometric craftsmanship does not clearly answer one basic question for the reader. If in any given situation, microsystem, aggregation functions and macrosystem are given, then as a result of manipulating linear systems we obtain solutions for macroparameters in terms of corresponding microparameters only. Consistency requires that these relations be satisfied. But the author uses a different approach, by means of the auxiliary regression. Thus, a more explicit justification of his procedure in terms of the auxiliary functions would provide additional information to the reader.

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Einführung in die Theorie der Zentralverwaltungswirtschaft. By K. PAUL HENSEL. Schriften zum Vergleich wirtschaftlicher Lenkungssysteme. (Stuttgart: Gustav Fischer. 1954. Pp. viii, 234. DM 11.50.)

Hensel's study is a first major advance in the theoretical exploration of the planning mechanism of a centrally administered economy since the controversy initiated by O. Neurath, von Mises and Max Weber got sidetracked in various attempts to calculate the prices of productive factors by means of Walras' and Cassel's systems of equations and O. Lange's later elaboration of a theoretical model of "competitive socialism." Unlike these earlier attempts at a solution of the problem of economic calculation Hensel is always conscious

of the fact that different economic systems must be understood as different forms of economic organization which have their own specific techniques and procedures for the determination of the relative importance of aims and means and hence call for different theoretical models for the analysis and interpretation of the manner in which the problems of allocation and over-all coordination of the parts into a whole find a solution.

In full recognition of the difficulties involved in any quantitative calculation *in natura* (*Naturalrechnung*) and in full command of the familiar general conceptual framework which permits us to view economic reality in terms of its technical and economic interdependence, Hensel develops a theoretical model of the planning mechanism by drawing, like Eucken before him, upon the experiences of the German war economy. But unlike Eucken he considers the problems of central economic planning as basically solvable. The model is based upon many carefully drawn distinctions the most fruitful of which is probably that between the elaboration of the plans for the various economic units, their coordination into a centrally equilibrated over-all plan, and the actual execution of the plan as well as its effective control by a central planning authority.

Whereas the execution of the plan and its control are based upon accounting prices and upon calculations in monetary units, the elaboration of the individual plans and their coordination into a central over-all plan takes place in terms of a calculation in kind, which Hensel shows is the only possible and completely adequate form of economic calculation. After having chosen the length of the planning period and having tentatively determined the requirements of direct goods in accordance with norms of consumption and the social preference scales of the central planning authority, the major task of the planning authority consists in the preparation of preliminary quantitative balances (*Mengenbilanzen*) which list the as yet tentative requirements opposite the available supplies and planned output of goods of all degrees of intermediacy. The next step is concerned with the translation of consumers goods into intermediate goods (including land and labor) by means of technical coefficients which express the technical input-output relations prevailing at the time. These technical coefficients enable the central planning authority to translate all quantitative plans for direct goods into as many quantitative balances of supplies and requirements as there are intermediate goods; in this manner it is possible to bring into the open the relative over-all scarcities of all goods in the form of deficits (or surpluses).

The totality of these quantitative balances and their respective deficits not only show the technical interdependence as well as the competing character and complementarity of all ends and means but bring to light the critical shortages of original factors of production (bottlenecks). As such these balances are the prerequisites for the final establishment of (partial) *equilibria* of all individual plans by either reducing requirements or increasing output. This adjustment in the form of an equalization of planned output and requirement can take place only in the light of a final review of the original tentative determination of the relative importance of different aims whose competing character has been made visible in the light of the technical inter-

dependence and the complementarity of all aims and means revealed by the deficits of the quantitative balances. This final decision within the planning authority takes necessarily the form of a weighing of the relative marginal importance of different objectives which must be sacrificed (or are to be attained) as a result of the necessary substitution of scarce intermediate goods (ultimately the original factors labor and land) from one use in an alternative one. Once this decision has been reached the adjustment of the quantitative balances is complete, the coordination of all individual plans (for each group of commodities and factors) emerges automatically; the position of a "general planning equilibrium" is attained; a central over-all plan has been established.

The important point is that the coordination and adjustment of the individual plans is solved beforehand within the central planning authority. The maximizing of "utility" takes place in the light of objectives of the authority. Hensel does not devote major attention to the question of the relationship between these objectives and those of individual households; however, he seems to imply that any adjustment of the plan to the wishes of individual households is incompatible (*systemfremd*) with the nature of a centrally administered economy. Inferences drawn from empirical data derived from centrally administered economies engaged in production for war and defense or for that matter rapid expansion of heavy capital goods industries may color our conclusions just as much as categories and generalizations applicable to one form of economic organization may mislead us. After all, the technical difficulties of establishing the preferences of individual households, for instance by public opinion polls, are much less formidable than the calculation of the technical coefficients involved in Hensel's translation of consumers goods into goods of different degrees of intermediacy.

It is not possible to develop this necessarily incomplete outline of the core of Hensel's positive solution in greater detail. Suffice it to add that the book concludes with a comprehensive analysis of the problem of price formation and the role of monetary calculation, both of which play an important role not in the drawing up of the plan but in connection with the effective control of its execution—particularly in connection with the central finance plan and the related function of banks as central control agencies and the establishment of various types of incentives related to the reduction of money outlays in individual production units, the avoidance of social costs (diseconomies) and the mobilization of labor in accordance with the directives of the plan.

A final part contains a useful comparative survey of the role and the method of economic calculation under conditions of decentralized market economies and centrally administered economic systems as well as a short section devoted to a penetrating survey of the evolution of the theory of economic calculation since Neurath advocated a calculation *in natura* during the second decade of the century.

The whole study is a vivid demonstration of what comparative economic analysis in terms of ideal types and models can achieve if it stays close to the nature of the case and if it steers clear of the danger of utilizing uncritically modes of thinking adequate for the analysis of one kind of economic order as well as normative prejudgments of all kinds which have nothing to

do with the problem at hand. The author's theoretical solution of the problem of economic calculation will receive valuable support in practice by the current work in the field of input-output analysis of which Hensel was apparently not aware.

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Business Fluctuations; Prices

Regularization of Business Investment. A Conference of the Universities-National Bureau Committee for Economic Research. Edited by Melvin de Chazeau. (Princeton: Princeton University Press. 1954. Pp. xxvi, 513. $8.00.)

The present volume makes available the papers and comments presented at a two-day conference sponsored by the Universities-National Bureau Committee for Economic Research to explore what contribution private business firms might make, in their own self-interest and without collusion, to our national economic goals of sustaining high levels of income and productive employment. The conference grew out of the concern of the members of the planning committee that in the historical context of the Great Depression, the war and the fears of the postwar years, economists and the public generally had perhaps been so preoccupied with the primary responsibilities of the government for stabilizing business conditions that inadequate consideration had been given to the potential contributions private business itself might make to this objective. That something worthwhile might be accomplished outside of government along these lines was suggested by the progress business had already made in reducing seasonal instability in production and employment and by the increasingly broad and constructive view many businessmen were known to be taking of their management responsibilities. But little serious consideration, either in academic or business circles, had been given to the question of just what responsibility private enterprise could prudently accept and reasonably be expected to discharge for reducing the severity of the cyclical declines in employment and business volume. Any possible contributions of business itself to reducing cyclical instability would further reduce the basis for some of the most serious indictments of the system. There was also some feeling in the committee that to the extent feasible, such action by business itself might be needed to reduce the dependence on government action which, while promoting sustained high levels of income, might weaken our private enterprise system.[1]

The conference brought together an impressive group of academic and business economists. Viewed as a whole, the volume provides much the best informed, broadly based and penetrating analysis of this subject matter so far available. While it is inevitable that not all of the papers come up to the high standards characterizing the volume as a whole, even the thinner papers provide fresh material that must be reckoned with. Every serious student of the

[1] The introduction to the volume makes the point that "professional literature is replete with analyses of and recommendations for government action and policy, but too little attention has been given to the impact of such proposals on the functioning, let alone the strengthening, of our private enterprise system" (p. xv).

business cycle and of stabilization policy for many years to come will need to be familiar with the papers in this volume. This is true as much for the issues left unresolved and for the suggestions of gaps in our knowledge and needs for further research, as for the important positive contributions made in the papers. In this connection, special attention should be given to the editor's introduction and the excellent "appraisals" of the conference by Don Woodward, Adolph Abramson and Ruth Mack in the final section.

Because of the broad range of material and analysis involved in the central issues of the conference and the generally high quality of the individual papers, the volume will also be a valuable reference for a much broader audience than would be primarily concerned with the specific problem of stabilization policy. The numerous insights provided concerning the way in which business decisions regarding investment outlays are made, and concerning the character and impact of important noneconomic and organizational factors bearing on these decisions are particularly valuable. Melvin de Chazeau's paper, which summarizes the materials gathered in his extensive field work on the investment policies and decision-making of some 45 leading companies under the auspices of the Committee for Economic Development, is outstanding in this respect, as well as in its wise and judicious analysis of the broader subject of the conference. In the words of one of the discussants from business, this paper "reflects a familiarity with the meanings, process, and functions of the modern business concern and the private enterprise system that would be remarkable for an academic economist even if it were not as rare as it unfortunately is." This paper will surely rank with the studies of investment behavior by Ruth Mack, George Terborgh, Walter Heller, and Michael Gort, for economists concerned with corporate investment policy and industrial organization. Kent T. Healy's paper on capital investment in railroads is also especially valuable for its combination of new material, careful analysis and a rich insight into the actual decision-making processes involved. Within the framework of more orthodox considerations and therapy, Joel Dean provides a broad and penetrating analysis of the financial implications for the firm of shifts in the timing of its investments.

The volume also provides important material concerning the effects of flows of funds upon the volume of investment, and the possibility of regularizing investment through changes in the financial policies of both business firms and private financial institutions. The generally excellent discussion of these matters in the paper of Jacoby and Weston is somewhat weakened however by failure to allow for the increases in funds from operations which business firms would have enjoyed had investment expenditures in fact been stabilized, as they assume in the rest of their calculations. Albert G. Hart gives a brief but highly suggestive list of government measures to promote regularization in private investment and B. H. Higgins reviews the efforts made along these lines in other countries. Brozen takes up the impact of technological change on the time pattern of business investment along with policies to stabilize investment in the face of erratic technological development. Abramovitz points up the implications of his research into business inventory policies on the stabilization problem in stimulating fashion and Millard Hastay provides a good

brief summary of the National Bureau's research of the cyclical behavior of investment outlays. Economists interested in any of these related problems as well as those concerned with the primary issue posed for the conference itself cannot afford to overlook the valuable material and analysis in this volume.

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The Great Crash, 1929. By JOHN KENNETH GALBRAITH. (Boston: Houghton Mifflin Co. 1955. Pp. ix, 212. $3.00.)

In this little book Galbraith boldly enters Error's den to do battle with one of her more innocent looking, but actually very dangerous, offspring, Complacency about a Speculative Boom in Stock Prices. Doubts about the reality of this particular beast should have been dispelled by the reaction to the Fulbright Committee hearings last March. Then, as in the 'twenties, the mere suggestion that stock prices might be going up too fast was treated as nonsense, or perhaps something even worse, both by the speculators themselves and by those leaders of business and government who confuse the prosperity of stock-market speculators with the prosperity of the whole economy. We must be profoundly grateful to Galbraith, Eccles, and the others who spoke out clearly and courageously about the dangers of the developing boom.

The Great Crash amplifies and reinforces Galbraith's testimony before the Fulbright Committee. His primary purpose, he tells us, is to recount the story of the great stock market boom of the late 'twenties and the crash which followed. This he does in a way to bring out the full drama and color of that most dramatic and colorful episode. In telling the story he also effectively points the moral: first, a boom once it has come to feed upon itself, *i.e.,* once the rise in prices has come to depend on the expectation of a further rise, is inherently unstable; and, second, a major break in the stock market is bound to have serious repercussions on business activity in general. The book is so well written and its lesson is so clearly developed that the chances are excellent it will justify the hope which its author expresses in the opening chapter:

> Since 1929 we have enacted numerous laws designed to make securities speculation more honest and, it is hoped, more readily restrained. None of these is a perfect safeguard. The signal feature of the mass escape from reality that occurred in 1929 and before—and which has characterized every previous speculative outburst from the South Sea Bubble to the Florida land boom—was that it carried Authority with it. Governments were either bemused as were the speculators or they deemed it unwise to be sane. . . . The wonder, indeed, is that since 1929 we have been spared so long. One reason, without doubt, is that the experience of 1929 burned itself so deeply into the national consciousness. It is worth hoping that a history such as this will keep bright that immunizing memory for a little longer.

The book's only weakness is in a very real sense a product of its great strength. The author becomes so absorbed in the fight with his chosen antagonist that he allows another of Error's brood, Oversimplification of Economic Processes, to escape practically unscathed.

Until the middle of the nineteen thirties depressions were generally explained in one of three ways: as part of a natural and inevitable rhythm in economic activity, as the product of stupidity and mismanagement on the part of foreigners, as the result of the collapse of a boom in stocks or real estate. In the early years of the Great Depression, Republicans generally favored the first two explanations, Democrats the third. Neither found its diagnosis of much use in devising measures to stimulate recovery. Republicans put their faith in time and the tariff, Democrats in the S.E.C. and other financial reforms. Both felt bewildered and frustrated by the ineffectiveness of these remedies.

The Democrats did, of course, try other things too, some of which turned out to be much more useful in helping to get us out of the depression. But their approach was largely a hit-or-miss sort of thing and many of them were never clear as to which measures had contributed to recovery and which had not.

We have learned a great deal in the last twenty years, thanks to the work of Keynes, Hansen, Currie, Samuelson, and others, about the causes of both depression and recovery. Galbraith refers to some of this work in his last two chapters. But the references are too brief to mean much to readers who are not already familiar with modern income and employment theory. For instance, many economists think that the leveling off of consumer demand in the late 'twenties for such major products as automobiles and houses was, through its effect on investment, quite as important a cause of the depression as the collapse of the stock-market boom. Galbraith's only reference to this phenomenon is in a footnote (p. 181)—scarcely enough to make much impression on the uninitiated reader. Most readers will, I am afraid, come away from this book with no greater understanding of what causes depressions than they might have had in 1929, or 1893, or 1837. Their overwhelming impression will be that depressions are, as the history books say, the result of "excessive" or "wild" speculation in stocks, or railroad building, or Western lands. An important element of the truth, no doubt, and one that should be re-emphasized for each succeeding generation, but scarcely the whole truth.

It is perhaps illegitimate to complain because the author of a thoroughly good book has not written another and even better book. I cannot help regretting, however, that while he was striking such a telling blow for economic sanity Galbraith let slip the opportunity to strike a blow also for economic sophistication.

Alan Sweezy

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Economic Fluctuations. By Maurice W. Lee. (Homewood, Ill.: Richard D. Irwin. 1955. Pp. xviii, 633. $6.00.)

Economic Fluctuations is designed for a one-semester course for either liberal arts or business administration undergraduates. It does not presuppose too much training in economic analysis, other than what might be supplied by an adequate introductory course. Its subject matter is sufficiently varied, yet with simplified descriptions, so that it can be understood by the newcomer and also be of interest to the concentrator.

The sections cover (in the following order) the nature of economic fluctua-

tions; the history of economic fluctuations in the United States; the nature and use of the national income accounts; business cycle theories; economic stabilization; forecasting; and international economic stabilization. The stabilization chapters also include the problems of a war (or siege) economy, and a recognition that such circumstances are no longer unique events. This reader in particular was pleased to see the international aspects treated as a major part, rather than as an addendum to the theoretical section. The author is also to be commended for his frequent cautions on the gap between theory and its application and the complexities involved in any policy implementation.

For the instructor relying on this text the end of each chapter contains many good essay questions, although some would be difficult to answer without the material contained in subsequent sections.

Quite a bit of space is allocated to the Keynesian concepts, and an excellent summary discusses the instability of the consumption function. In fact, most of the major concepts associated with macroeconomics are treated quite well. Unfortunately, their integration into a coherent theory is not as successful; it is doubtful if the average student will grasp the process fully without further explanation by the instructor. The author could also improve his exposition of the equality of savings and investment.

There are other defects, some of which can be remedied quite easily by anyone selecting the book, but others would require revision in a new edition. The major structural deficiency is the placing of the historical before the theoretical sections. It would be difficult to have much of a classroom discussion of the former without first having available some analytical aids. For example, the open market operations of the '20's are discussed on page 206, but their influence on the banking system and the economy in general is not explained until pages 458-59. Similarly, the historical section has frequent references to fiscal policy, well before its cyclical effects are covered.

Although most of the theoretical summarization is satisfactory, two areas in particular could be improved: those concerned with Wicksell and the natural rate of interest, and liquidity preference. The latter should certainly be expanded, in view of its crucial role. Greater space could also be given to suppressed inflation and its control.

The book also suffers from minor lapses and errors which can easily be remedied. For example, page 392 refers to a nonexistent accompanying chart; page 478 refers to a table containing both long- and short-term rates, but only the former are given; while a reference to Fisher on page 327 could not be found.

Regrettable, too, is the repetitiveness at times of the style. Occasionally a short explanation is followed by a summary practically repeating the idea almost word for word. Or sloppy phrasing leaves the reader in doubt as to just what is meant; to illustrate, on page 486 the student would be puzzled whether the increase in the public's holding of the government debt meant the public, as stated, or the commercial banks, as is meant. Similarly, the anecdote (p. 84, fn. 1) will be lost unless it is realized that reference is being made to a least-squares curve.

However, these defects actually are merely annoying, for the text is other-

wise very acceptable. The general tone is eclectic and cautious, a quality of the book with which this reviewer is most sympathetic. The theoretical material is summarized compactly, avoiding the excessive length that make compendia of so many works. The historical and factual discussions are generally quite clear, so that the cause and effects can be readily followed, especially since the author provides so many charts and short tables. These can also serve for classroom problems, since enough are supplied to allow for divergent interpretations and policy recommendations. For this alone the busy instructor should be thankful.

EDWARD MARCUS

Brooklyn College

Money and Banking; Short-Term Credit; Consumer Finance

Quelques enseignements de l'évolution monétaire française de 1948 à 1952. By PIERRE DIETERLEN. Centre d'Études Economiques. Études et Memoires No. 19. (Paris: Librairie Armand Colin. 1954. Pp. 232. Fr. 750.)

In seeking the lessons of France's monetary developments from 1948 to 1952, Mr. Dieterlen has done a very valuable piece of research. He reviews, in the first part of the book, the theoretical prolegomena, which he exposes, however, not as a self-contained body of doctrine but rather as a framework within which he discusses, in the second part, the various phases and aspects of France's monetary developments, and, in the third part, its monetary policy. Throughout the book, he seeks in France's monetary experience the fundamental lessons and their implications for monetary policy today.

The gist of the author's observations is that, during recent years, inflation in France was attributable not so much to the government deficit, the rise in wages, and the continued large volume of fixed investment, as to speculative and precautionary motives that prompted businessmen to exploit adroitly all of these phenomena by shifting from cash into nonmoney assets—and by borrowing to acquire such assets—in anticipation of market conditions, price movements, etc. Such moves by businessmen could not always be effectively countered by monetary policy alone. In Dieterlen's opinion, the credit controls adopted in France prevented a hyperinflation at the time of their establishment in 1948 and again in 1951, but were unable to prevent, after the Korean outbreak, a greater degree of inflation in France than in other European countries—largely because of the "safety valves" that rendered these controls partially ineffective, since both the government and business, each for reasons of its own, were reluctant to accept more stringent restraint. The crucial importance of speculative and precautionary motives as the inflationary factor in contemporary France is also attested, but in a negative way, by developments in 1952 and 1953: as business sentiment and expectations became at that time less "speculative," even the combination of a persistent government deficit financed to a large extent by recourse to the banking system, of political uncertainty, of social unrest, and of course, of easy money, failed to give rise to any inflationary strains.

Institutional, political, and psychosociological forces must undoubtedly be taken into account in any realistic study of inflation in the contemporary world. Dieterlen's effort to enliven abstract economic analysis and the interpretation of monetary data with continuing reference to the "real" world is therefore to be welcomed. Yet I wonder whether, in discussing the inherent limitations on monetary policy in France, he does not take too much for granted. True enough, for reasons that are well known, monetary and fiscal policies in France are not complementary; in effect, monetary policy, in addition to its proper tasks, has also the task of offsetting the inadequacies of fiscal policy. Nevertheless, while recognizing the tremendous difficulties of monetary policy in France, the question may well be raised whether creeping inflation, however tempered it may be by periodic pauses, is as inevitable as Dieterlen seems to imply. Exception should, I believe, also be taken to some of his interpretive comments. For instance, he regards quantitative credit controls as something different from discount and open-market policy, thus confining such controls to rediscount ceilings and primary and secondary commercial-bank reserve requirements and their variations—as if discount and open-market policies were not quantitative credit control instruments par excellence. Furthermore, he seems to have somewhat greater confidence in qualitative credit controls, unaided by general monetary restraint, than appears warranted in the light of the postwar experience. Finally, his scepticism about the effects of interest rate fluctuations, even though seemingly corroborated by recent developments in France, appears unduly generalized.

Altogether, Dieterlen's book is a very valuable contribution to the recent literature on money. His theoretical framework is not only well presented, but also refreshingly full of new insights; his statistical analysis ingenious; and his discussion of policy problems illuminating. It is a most helpful book, which deserves to be studied carefully not only by those interested in France, but by anyone who wishes to keep abreast of current thinking in the field of money and banking.

M. A. Kriz

New York, N.Y.

Trends in Consumer Finance. By M. R. Neifeld. (Easton, Pa.: Mack Publishing Co. 1954. Pp. xiv, 142. $6.00.)

M. R. Neifeld's "Trends in Consumer Finance" is a comprehensive study of small loan companies, whose lending operations account for about 6 per cent of total consumer credit outstanding. The title of the book is somewhat misleading since the term "consumer finance" normally refers to the broader scope of consumer savings and credit.

Neifeld traces the development of small loan companies in the United States under the Uniform Small Loan Law. He discusses volume of loans made, repayments, receivables, charge-offs, expenses including advertising, interest charges and earnings, capitalization, and profits. Neifeld presents a typical small loan company, shows its "break-even" size and the loan-mix by size of loans. The book also covers the characteristics of small loan company borrow-

ers, the reasons for borrowing, and the security used for loans. These facts are presented in tabular and graphical form, many from 1938 through 1952, on both a national and state-by-state basis. Much of this statistical information was not available heretofore. Special compilations were prepared by state banking officials at Neifeld's request and numerous gaps were filled by careful estimating on the author's part.

This book makes a real contribution to our statistical knowledge of small loan companies and the role they play in today's society. It should serve as a valuable source of information for anyone interested in consumer lending.

DUNCAN McC. HOLTHAUSEN

Tenafly, N.J.

Money, Banking and the Financial System. By MILTON L. STOKES and CARL T. ARLT. (New York: Ronald Press. 1955. Pp. vi, 670. $6.00.)

The increasingly troublesome "book surplus" problem places a heavy responsibility on the writers of any new text, especially in the field of money and banking, to justify their action by making explicit the nature of the contribution they feel they are making to the cause of education.

In the case of the book now under review the authors maintain, quite rightly, that the chief handicap of the student of money and banking "is a tendency to forget the central theme of the subject, namely the role of money and financial institutions in the determination and fluctuation of price and income levels." Such students, they say further, "need an explicit frame of reference for understanding and relating the various aspects of an admittedly complex subject." This "frame of reference" is provided most adequately by the first four chapters of the book which give a very lucid discussion of monetary theory designed especially to "show the strategic importance of the flow of money expenditures as a determinant of price levels, income, and output." This inherently difficult material is presented in terms that should be readily grasped by any student who has had a minimum of an elementary course in economics.

This introductory section, which comprises about 15 per cent of the entire book, is followed by chapters of a more descriptive nature that cover all the topics traditionally taught in a course in money and banking. The teacher of the subject will be particularly interested in the arrangement of this material designed to make the book more flexible in use. It could very well be used for a one-semester course by omitting the sections on international economics and trade, on money markets, and the financing of investment and consumer expenditures. These topics are very often taught in separate courses anyway. On the other hand, by dealing with certain sections more intensively and by providing a moderate amount of outside reading, the text could well serve the needs of a full-year course.

For those who still believe that a student will gain a better understanding of today's problems through a study of the evolutionary development of our monetary and banking institutions, there are several good but somewhat brief historical chapters. The two on the development of monetary standards in the United States and the three on the historical development of commercial and

central banking provide a background and perspective which should make for a more intelligent study of the material that follows.

The practice of introducing certain "panoramic" chapters giving a broad outline of the subject and following these with other chapters presenting the more detailed analysis and description should enable the student to orient himself better and make his reading more fruitful.

The book is written in an easy flowing and, in spite of its dual authorship, even style which should make an especial appeal to the undergraduate student. There is a nice balance maintained between theoretical analysis and the mechanics of operation of the various institutions treated.

WALLACE WRIGHT

Iowa State College

Business Finance; Investments and Security Markets; Insurance

Investment Principles and Policy. By RALPH R. PICKETT and MARSHALL D. KETCHUM. (New York: Harper and Brothers. 1954. Pp. ix, 820. $6.00.)

This textbook is intended for college students and for investors interested in acquiring a knowledge of the basic principles of investment. The volume is well written, comprehensive in coverage, and it constitutes a useful addition to the other existing textbooks in a field that is once again receiving increasing attention by both college students and the public at large. Economists, in particular, will be gratified by the sophisticated treatment given to the study of business fluctuations and to the forecasting of business trends.

The usefulness of the book, however, is limited by the decision of the authors to refrain from discussing investments from the viewpoint of the institutional investor as distinguished from the individual investor. This is a defect not only because a substantial part of the professional students of investments are likely to find employment with the investment departments of life insurance companies, pension funds, mutual funds, etc., but especially because the operations of these institutional investors have a profound effect on the behavior of the securities markets. This was brought out emphatically at the recent hearings before the Senate Committee on Banking and Currency on the stock market which constitute an essential supplement to all existing textbooks on the subject. This omission is all the more regrettable because the book is of inordinate length. Such length is hardly necessary in a field in which the daily financial section of the newspapers, annual reports of corporations, and a flood of releases by investment houses are readily available as supplementary sources of information.

In its discussion of the instruments of finance (Part II), the book gives a more specific discussion of common stocks by industries than most other textbooks and this is all to the good. However, the short shrift given to the specific problems of the petroleum industry in the chapter on mining securities is puzzling in view of the fact that petroleum shares tend to constitute the largest proportion of the typical investment portfolio.

WERNER BAER

Hunter College

Public Finance

Essays in Public Finance and Fiscal Policy. By Gerhard Colm. (New York: Oxford University Press. 1955. Pp. xvii, 367. $4.75.)

When Gerhard Colm came to the United States from Germany in 1933, he had already attained a substantial publication record dating over more than a decade, with emphasis on public finance, but with ramifications extending into such fields as international trade and sociology. His move to the United States did not interrupt his flow of writings, and articles on principles of government expenditures and taxation and upon depression fiscal policy began to appear in the American journals. His study of the distribution of tax burden by income class, made with Helen Tarasov for the Temporary National Economic Committee, was the first systematic study of this question in the United States. The war and postwar period saw increased emphasis in his writings on fiscal policy in inflationary periods, the governmental sector in the national income accounts, the national economic budget, and projections of income flows into future periods. From his early affiliation with the New School for Social Research, he moved on to various governmental agencies, including the Bureau of the Budget, and finally, the Council of Economic Advisers, where he served as chief expert in the field of public finance. When the Council was reorganized as a result of the change in administration, he left the government service to become chief economist of the National Planning Association.

In this volume of essays, seventeen of Dr. Colm's articles, written between 1934 and 1953, are reproduced, together with one new essay prepared for the volume. Except for elimination of some sections involving excessive duplication, the material is reproduced in unchanged form. The primary emphasis is upon fiscal policy and economic stabilization, with eight articles on this subject. Three articles deal with national income accounts and the national economic budget, four with principles of government expenditures and taxation, and three with the general nature and role of economics and public finance. Unfortunately no material was reproduced from the study of tax burden.

The earlier essays emphasize the extent to which Colm broke away at an early date from the narrow confines of traditional public finance to study the economic effects of governmental expenditure and tax programs, and to advocate the use of fiscal policy as a deliberate instrument for gaining greater economic stability. But he was never an extreme exponent of functional finance; throughout his writings he emphasized the obstacles in the way of successful fiscal policy, together with the problems created by the conflict of the goal of economic stability with other economic goals, and the difficulties of trying to solve by fiscal policy the problems created by other disturbances in the economy. Colm was one of the first to stress the possibility of tax adjustments as an instrument of fiscal policy, in the period in which the whole emphasis was placed upon expenditure aspects. He recognized the importance of flexibility in the operation of fiscal policy, with adjustments in terms of changing conditions, and the ever-present need for evaluating policies in terms

of a dynamic, rather than a static, economy. He has likewise stressed the need for measuring, quantitatively, the various income flows and the precise effects upon them of governmental policy, and for the projection of the data into the future.

So far as the role of economists is concerned, Colm's point of view represents the opposite extreme from that of Lionel Robbins. To Colm the traditional dichotomy between goals and means is an artificial and unworkable one; the economist must consider both, and is under obligation to make policy recommendations, not merely to evaluate alternative means of reaching given goals. Deliberate intervention by the government in economic affairs is regarded as necessary, and not incompatible with the maintenance of democratic institutions. In his work with respect to various types of taxes, Colm argues that the concept of equity in taxation must be developed in terms of the particular stage of economic and political development of the country. In conformity with this thesis, he defends the corporation income tax on the basis of the argument that at present the government is essentially a partner with business firms in the conduct of economic activity, and thus is entitled to a partner's share of the profits. To many, including the reviewer, this argument is nothing more than a flimsy rationalization of the actual treatment of corporate income.

The essays clearly reveal Colm's breadth of vision and interest, and the development of his philosophy of public finance over two decades. But his ability to see the over-all picture, and to break through traditional confines of analysis exceeds the strictness of his logic. The analysis never attains a high level, and abounds with broad unsupported generalizations. His greatest contributions have been those of emphasizing the need for seeing interrelationships of the governmental and private sectors of the economy, in stimulating others to more penetrating analysis, and in popularizing, especially in government circles, the new doctrines of fiscal policy. Along these lines his contribution has been substantial, and the present book may be regarded primarily as a tribute to this feature of his work, rather than as a contribution to the subject matter of public finance. The excessive repetition which still remains, and the lack of comprehensiveness of coverage make the book of little value for classroom purposes.

JOHN F. DUE

University of Illinois

The Redistribution of Income in Postwar Britain—A Study of the Effects of the Central Government Fiscal Program in 1948-49. By ALLAN M. CARTTER. (New Haven: Yale University Press. 1955. Pp. viii, 242. $5.00.)

This book seeks to interpret the alteration by government taxing and spending of the size distribution of family incomes in what may well have been the peak year of redistribution by the Labour government. By his careful inquiry Professor Cartter has contributed to the understanding of a subject of wide interest and has advanced comparative study in the field of income distribution, building solidly upon the earlier work of a small group of econ-

omists. Using the findings of Tibor Barna and John H. Adler and others he is able to present the 1948-49 experience in the perspective of prewar British and prewar and postwar American experience.

The leading conclusions reached by the author may be briefly summarized as follows:

1. It should be noted to begin with that out of a total national income of £9.8 billion the central government collected in taxes and disposed of £4.1 billion.

2. All taxes taken together, including a special capital levy, were found to have a progressive effect, ranging from 24.5 per cent of the total of "private income" received by those in the lowest income group (under £135 of taxable income) to 106.6 per cent for those in the highest income group (£20,000 and above). (Table 12, p. 44.)

3. All central government expenditures taken together were found to be distributed regressively. The group receiving under £135 of taxable income "received" benefits equal to 92 per cent of the total "private factor income" received by the group, while those in the £20,000 and over group received benefits equal to only 10 per cent of their incomes, assuming that the indivisible benefits (military, etc.) were distributed proportionally to "net private income." (Table 17, p. 53.)

4. "The breakeven point, or the income at which the average taxpayer contributed in taxes exactly the amount which the government spent in his behalf, fell somewhere between about £550 and £650 of taxable personal income. (In terms of private income, including undistributed profits, the breakeven point was between £700 and £800.)" (P. 63.) Cartter observes that ". . . one can fairly safely conclude that about 80% of the population was on the gaining end, and at least 10% was on the losing end" (p. 120).

5. Excluding indivisible benefits, which comprised £2.4 out of the £4.1 billions expended, the breakeven point was, of course, lower, at about £225 of taxable income. This means that as far as tangible benefits to individuals are concerned only about 25 per cent of the population showed net gains over what they paid in taxes (pp. 54, 120).

6. A summary view of the extent of the total redistributive process may best be afforded by the proportion that posttax and postbenefit incomes were of pretax and prebenefit incomes. The posttax and postbenefit income total for the group having less than £125 of taxable income was 156.7 per cent of the pretax and prebenefit total of income. For the group having incomes over £20,000 the comparable percentage was 12 per cent, including the effect of the capital levy. (Table 25, p. 63.) Of the national income 13.1 per cent was "lost" by some income groups, in the sense that taxes exceeded benefits, and gained by others (p. 79).

7. Comparing the situation with 1937 Cartter found that there was slightly less inequality pretax in 1948-49 than in 1937. But, "... redistribution appears to have been greater in postwar Britain in absolute terms and relative to the national income but slightly less per pound of tax revenue raised" (p. 79).

8. In comparing the British experience with that of the United States, Cartter found that, after adjusting U.S. data to show the same governmental

functions as those performed by the British central government, "Both before and after the war the redistribution of income was substantially greater in Britain. Combining a somewhat more equal initial distribution in postwar Britain with a greater redistributive effort, we find that the distribution of final consumer income in postwar Britain was considerably less unequal than in the U.S." (pp. 91-92).

9. In addition to the immediate redistributive policies, there are long-run programs designed to reduce inequality, which Cartter examines. ". . . the expansion of environmental services and the gradual decline in large inheritances, if these are permanent features, will undoubtedly have a tendency to diminish extreme inequalities of opportunity for future generations" (p. 110). Also, it is emphasized that ". . . there is present in Britain an additional force not included in the previous estimates redistributing incomes *to* persons with large families" (p. 116).

A study of the redistribution of income requires not only considerable economic deductive analysis but also intimate knowledge of the tax and expenditure programs. Further, the study can only be as good as the basic data on income distribution, capital holdings, and consumption patterns allow. The difficulties of seeing the problem as a whole are magnified many times when the attempt is made to compare across time and across national boundaries. Because of the many difficulties confronting the researcher in this field the reader is cautioned against easy acceptance of these conclusions, particularly the comparative statements, as "facts."

Although Cartter provides in Part II of his book a seemingly exhaustive presentation of his methods, there are a number of leaps from sketchy data to complete estimates which emphasize how much individual interpretation is involved. To this reviewer the most glaring example of such "interpretation" is the easy move from a taxable income distribution to a number of other income distributions, which are then used as the basis for comparative study. One of the methods used is to "sandwich" various types of nontaxable income into taxable income brackets without making any estimates of numbers of income recipients who might be in the newly created income bracket. The result is that the income recipient column does not match up in any known way with the income columns. (See pp. 137-51.) No sources are cited for a number of income distribution tables and graphs presented throughout the book. (For example, see Figures 5 and 6 on pp. 75-76.)

While a factual study of income redistribution among income groups provides only limited insight into the qualitative change in social arrangements brought about by the modern "welfare state," such a study is basic to appreciation of the directions in which we are moving.

ROBERT J. LAMPMAN

University of Washington

The Problem of the National Debt. By EDWARD NEVIN. (Cardiff: University of Wales Press. 1954. Pp. 115. 6*s*.)

This compact little book essays two tasks: determining empirically the distribution of interest payments on the British national debt, and proposing

a reform of the debt structure to make it a more effective instrument of economic policy. Details of the empirical study will probably be welcomed by British readers, but Americans will find this section heavy going. However, Dr. Nevin finds the pattern of distribution to be similar to that of other advanced nations, so that the proposals based on his findings are of general validity and interest. For some reason, he does not present any data on distribution measured by capital value, although that would have been relevant to his subsequent discussion.

Over 20 per cent of the interest is currently paid to government agencies (including the Bank of England). Since this leads to budgetary confusion and irrationality, he recommends an end to this method of financing public services. Another 10 per cent of the interest goes to commercial banks, representing a subsidy for banking services. The author recommends that nontransferable securities be issued for bank ownership, the interest determined openly by the subsidy required for the public services they perform. The securities would have no maturity dates, but the banks would be permitted to cash them in at par after a suitable notice period, or to cash them on demand at a discount. The government might redeem these at par after giving the same notice, or on demand at a premium.

For the private owners of the debt, special issues would also be devised. Institutional investors, such as insurance companies, could continue to hold long-term marketable issues with specific maturities. For individuals, nontransferable personal certificates would be issued in small denominations, with redemption and call features similar to the bank issues. These features would protect against a mass demand for redemption.

These measures would very largely isolate each of the major sectors of debt ownership and would facilitate the exercise of monetary policy by permitting the government to deal directly with each independently. Unnecessary turnover of maturing debt would be reduced, but the liquidity of small savers and commercial banks would be safeguarded. By manipulating the terms of issue and redemption, and by exercising its option to redeem, the government could cause any sector to increase or decrease its holdings, thus affecting the money supply and/or the availability of credit to specific sectors. These proposals seem to offer much toward making the debt a functional part of financial policy in any country.

The author could have made some interesting comparisons between his proposals and similar practices actually in use—U. S. savings bonds, for instance, or the bonds issued to banks in the reorganization of the German banking system.

One regrets that the book deals only with problems of managing a debt of given size. The large questions revolving around increasing or decreasing the debt are not discussed. The author has done a good job within the limits chosen, and one laments the omission of other topics because of the feeling that they would have been well treated also.

PAUL B. TRESCOTT

Kenyon College

Fiscal Policy: Its Techniques and Institutional Setting. By JAMES A. MAXWELL. (New York: Henry Holt and Co. 1955. Pp. vi, 218. $2.90.)

In these tightly packed but readable pages, the author offers a realistic, extensive, and nontechnical survey of American techniques and institutions for implementing countercyclical fiscal action. Most of the arguments and conclusions may be found elsewhere in the literature—the author claims no originality in this work—but the skillful integration of political and economic ideas, research findings, description, and historical references into a swiftly developing argument is unique.

Professor Maxwell's core conclusions, developed in the first half of the book, are that discretionary fiscal action ought to be employed after a turning point has been reasonably established, and that built-in flexibility of the federal budget should be relied on as the first line of defense against recession or boom. According to the author, this arrangement is preferable to one which relies on forecasts of economic conditions, because explosive results may be obtained from unreliable forecasting and techniques of uncertain power; political delays and bias tend to negate prompt and rational discretionary action; and structural maladjustments in costs and prices are more likely to be corrected if strong fiscal action operates with a lag. To minimize the dangers of cumulative movements and the inflexibility of a rigid system of built-in stabilizers, the degree of built-in flexibility should not be too strong, but tardy discretionary action should be vigorous. These conclusions are placed in proper relationship to other aspects of policy and the institutional environment in chapters which cover a gamut of subjects from monetary policy and debt management to the work of the Council of Economic Advisers and the Joint Committee on the Economic Report.

Detailed analysis of feasible techniques to increase the degree of built-in flexibility and to implement dicretionary action is presented in the second half of the volume. The author concludes that his computations indicate that the existing degree of built-in flexibility is modest and ought to be strengthened in a number of ways, including, among others, higher per capita exemptions and steeper progression in the individual income tax, longer carry-backs of business losses, replacement of federal public assistance grants with block grants which vary countercyclically, and enlargement of federal grants for state-local construction to provide semi-automatic cyclical offsets. Concluding remarks discuss the implications for democratic liberties of shifting some or all fiscal authority from Congress to the Executive, and end on an optimistic note about present institutional arrangements.

Many exceptions which might be raised against Maxwell's conclusions are weighed in his book and require no additional comment here. But there are some issues which I find inadequately treated. Though there are illuminating references to such social goals as freedom, progress, and equity, economic efficiency tends to be suppressed, except in the discussion of wastes of unemployment and make-work schemes for elminating it. There are a number of comments, more or less related to monetary matters and debt management, which seem extreme in their unqualified form. For instance, the allegation that

short-term treasury financing at low interest rates during 1945-1951 was responsible for inflation (p. 26) is unduly controversial, and the inference that classical writers thought an addition to government spending would produce inflation at full employment (n. 17, p. 11) is surely misleading, if not erroneous.

The conclusion that countercyclical excise tax rate changes should be confined to goods with inelastic demand (pp. 195-98) is, in my opinion, erroneous. As applied to tax reduction, the argument is that tax cuts on products of elastic demand would not reduce excise collections very much, and, by lowering prices of these relieved products, would expand their use and absorb income which otherwise would have been spent on other goods. The effect would be to stimulate the favored industry largely at the expense of others. On the other hand, excise reductions on commodities of inelastic demand release income for expenditure on other goods by roughly the amount of decline in tax collections, and stimulate other industries at the expense of the Treasury. But this argument sidesteps an important consideration. The expansionary effect of an excise cut is roughly equal to the decline of tax collections, and there is *some* rate-cut which will reduce collections on goods of elastic demand —by the full amount in the limiting case of removal of the tax. Though it is true that the expansionary effect in this case directly benefits only the taxed industry and that spending on other products will be more or less reduced, the total expansionary effect on aggregate demand is not for these reasons any less than that of an equal reduction in revenues on goods for which the demand is inelastic. Moreover, excise relief for products with elastic demands should not be denied merely because the industries concerned are the chief immediate beneficiaries, for the demands for their products are often the hardest hit by a general decline in incomes.

These criticisms, however, do not weigh heavily against the many advantages of this book. It is an excellent survey for use in government finance courses, and it can be read profitably by economists in other fields who desire a brief, modern treatment of fiscal policy.

CHALLIS A. HALL, JR.

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International Economics

Problems of Economic Union. By JAMES E. MEADE. (Chicago: University of Chicago Press. 1954. Pp. ix, 102. $1.75.)

Professor Meade deals with a number of problems, international and domestic, which are involved in the establishment of an economic union. As he characterizes it, the purpose of such a union is to increase levels of living by improving economic efficiency through the creation of a large free-trade area and, perhaps, also through the creation of a large area within which the factors of production can freely move to the most productive employments. He assumes that the countries would wish to do this in a way compatible with the avoidance of booms and slumps and with the maintenance of equilibrium in their balances of payments. The implications of forming such a union for

the domestic economic policies of the countries involved are also explored. The principal conclusion is that large-scale delegation of authority on domestic as well as foreign policies by the nations concerned to the Union's central agency would be necessary to accomplish the objectives of the Union.

The brevity of the book has resulted in the elimination of both rigorous proofs for some of the arguments made and of additional actual or hypothetical examples. Fortunately, however, brevity has not caused the author to limit the scope of the problems to which he addresses himself. Meade presents a welcome objective analysis which sets this problem in a useful perspective.

Attention is first given to the problem of the creation of a single free-trade market within the Union. Using the "welfare" approach, he finds that the members of the Economic Union would have to give up all direct interferences in international trade and payments, including the less obvious protective devices such as customs procedures. Difficult as we know these foreign economic policies are to achieve in practice, Meade also points out that to meet his "welfare" criteria the achievement of the goals of the Economic Union would require important delegation of authority in major fields of domestic policies on monopolies, taxation, defense, etc.

Perhaps for purely personal reasons, the reviewer found most interesting, and would like to devote most of this review to the chapter dealing with the balance of payments, in which Meade considers the question of whether in the modern world there is any practicable alternative mechanism for adjusting balances of payments among the members of the Union other than variations in direct trade and exchange controls. Three different basic methods are discussed, namely, that of "accommodating finance," inflation or deflation, and variation in rates of exchange. The first method, which the very name explains, is regarded as unsatisfactory as a continuing device for meeting a permanent balance-of-payments problem.

The second method of inflation or deflation, as the case may warrant, is also essentially discarded. The discussion of this method is conditioned by the author's basic assumption that the members of the Union wish to avoid either booms or slumps. Meade notes that the problems of adjustment to changes in relative domestic prices would be eased by the removal of trade barriers, free movement of labor and the application of the principle of multilateralism to all monetary transfers between members of the Union. He then goes on to argue that the adjustment of trade flows to changed price relationships would be bound to take time and, in the meantime, there would be need for some accommodating finance to cover the temporary deficits in the balances of payments. Meade seems to feel that, if this method of adjustment is used, it would be best done through instituting a single currency.

The author sees great difficulties in achieving balance-of-payments equilibrium through domestic stabilization policies. The major difficulties would, however, seem to stem at least in part from the either-or method of approach. If one assumes serious problems of disequilibria in many countries, resulting from conditions of advanced inflation or deflation, it obviously becomes a matter of considerable difficulty to achieve equilibrium through changes in

domestic policies alone, or indeed, through any single line of policy. If, however, less difficult conditions are assumed to exist and/or the authorities have available a *combination* of policies, then—and I am sure Meade would agree—domestic stabilization policies become both an essential and feasible part of the program of achieving and maintaining international equilibrium.

Meade is obviously enamored of his third solution, namely, variations in exchange rates. His arguments for exchange rate changes as a means of adjusting balances of payments are quite familiar, and like many others, Meade sees their principal charm in their compatibility with the maintenance of full employment and internal balance. More interesting is his discussion of the use of "free exchange market" versus "adjustable-peg." The first method envisages a free exchange market in which the various national currencies of the countries concerned are subject to the daily or hourly fluctuations of supply and demand accompanied, perhaps, by the intervention of official exchange equalization funds. The second system is that "envisaged under the Articles of Agreement of the International Monetary Fund." According to Meade, under the latter method there are long periods in which "more or less rigid" exchange rates prevail and "then from time to time there are large once-for-all changes in exchange parities in order to restore equilibrium to disordered balances of payments" (p. 46).

Meade is an able advocate of the free exchange market. There is much with which to agree in his arguments; for example, his point that the impediments to trade due to the uncertainties of exchange rate changes are much less significant than those due to an extensive system of exchange controls and import licensing. Others of his conclusions are, perhaps, more doubtful, such as the judgment, which he seems to make, that the problem of competitive devaluation has become much less important—a conclusion which might well be suited to the decade 1945-55, but maybe not to the next decade when satisfactory levels of domestic activity may be coupled with very competitive conditions internationally. His description of the "adjustable-peg" would seem to generalize from a short period of history, particularly the widespread devaluations of 1949, which can not offer a sufficient basis for generalization. The reviewer shares the author's abhorrence of overvalued exchange rates as a cause of balance-of-payments disequilibrium. There is, however, nothing in the method of operation of the Fund which would prevent the mechanism of exchange rate adjustment envisaged thereunder being used effectively as a means of avoiding unrealistic exchange rates. The same factors which cause countries to try to maintain overvalued exchange rates may also operate to prevent the effective functioning of a free exchange market. Intervention by the monetary authorities directly in the exchange market or through limiting access to the exchange market might recreate some of the evils which Meade seems to see resulting from "adjustable-pegs." He notes that for his system of free exchange market "to work at all there must be reasonably reliable principles governing the internal monetary policy of each country. . . . If a national government fails to carry out an effective financial policy for domestic stabilization, the resulting continuing inflation of prices and incomes or the resulting uncontrolled depression will make it quite impossible for any one to judge

whether that member's exchange rate is at any time over-valued or under-valued . . . trade between countries concerned will be subject to wild uncertainties and speculation" (pp. 53-54). It is the conviction of the reviewer that under the conditions set forth for the favorable operation of the free exchange market, and assuming the removal of direct import and exchange restrictions, as is done by the author, the difficulties of successful operation of a system of exchange-rate adjustment as set forth in the International Monetary Fund Agreement becomes much easier to overcome than is suggested by Meade. Both systems are undermined by inflationary domestic policies; both systems become much more manageable under conditions of domestic stability. When domestic stability and international equilibrium (without direct restrictions) have become the rule for some time, we will be in a better position to judge the merits of this controversy of "free exchange market" vs. "adjustable-peg."

Meade also has an interesting chapter as to whether the formation of a single integrated market for products is sufficient to ensure the use of the resources of the group of countries forming the Union in the most efficient manner or whether these countries must also allow their resources of capital and manpower to move freely from country to country in search of the most productive employment. The author summarizes, as the basis for his analysis, Samuelson's arguments as to why under certain conditions freedom of trade and products will suffice. He analyzes what he regards as some of Samuelson's assumptions in order to demonstrate why freedom of trade would not be sufficient in practice. He gives six reasons for his conclusion, namely, differences among member countries in productive atmosphere and in the scale of production; transportation costs; the complete specialization of certain regions on certain lines of production; the existence of a large number of factors relative to the number of standardized traded products; and marked differences in the technical possibility of substituting one factor for another in the different industries producing traded products. These arguments are, of course, limited to the movement of labor, but Meade notes that a similar analysis could be used to demonstrate the need for the movements of capital from capital-rich to capital-poor regions of the Union. He realistically sees and discusses some of the difficulties in achieving the movement of free labor and capital. In effect, it would mean, for example, that member states would have to keep in step in their policies for the distribution of income.

Even this brief summary of Meade's arguments should demonstrate what is perhaps the most important conclusion to be drawn from the book, namely, the far-reaching character and thorough-going nature of a real economic union. It will help avoid the confusion of regarding the transfer to some supranational or international body of one or two precisely defined economic functions as the same thing as the formation of an economic union. In view of the practical difficulties involved, Meade writes that he does not see the possibility of achieving a real economic union between important countries by a single constitutional change, but that he would rather be inclined to advocate the development of the institutions which are already at hand. It may be noted that the preconditions for the achievement of economic union by coun-

tries which are willing to make the necessary political decisions to achieve the advantages of this step, are made easier by further progress in international economic, financial and monetary cooperation. Through such general cooperation countries not only begin to create those economic preconditions which might facilitate the formation of economic unions, but also begin to learn the hard process of adjusting national economic policies to internationally agreed standards and procedures.

IRVING S. FRIEDMAN

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International Trade Under Flexible Exchange Rates. By JOHN BURR WILLIAMS. (Amsterdam: North-Holland Publishing Co. 1954. Pp. xiv, 332. $5.00.)

This book, though it claims to present a "new theory" of international trade, actually works for the most part within traditional confines. Its novelty lies in its concentration upon the short run, and in its rejection of multiplier theory as the main tool of short-run analysis. Williams' theory is based on the notion that supply curves for individual commodities are fixed in the short run in money terms, and on a simple version of the quantity theory of money which holds that aggregate spending will change only in response to changes in the quantity of money. The volume of spending, however, is assumed to affect the level of economic activity rather than the level of prices, the general price level being tied to the level of wages, which is assumed to be fixed in the short run. Interest rates are assumed to be determined in the market for new issues of securities, and savings are assumed to find their way into real investment through the market for new securities (p. 165). Hence increases in the desire to save within a country are reflected in interest rates and investment; not in aggregate demand or unemployment. Likewise, changes in the desire to purchase foreign securities are reflected in interest rates and exchange rates; not in aggregate demand or unemployment.

Within this system, where by assumption economic activity is uniquely linked to the quantity of money, it should be no surprise that neither reparations nor exchange manipulation nor private foreign investment will alter the level of economic activity unless at the same time the quantity of money is changed.

Williams relegates consideration of changes in spending to a single chapter of fifteen pages. If payment of reparations is financed by new bank credit, the paying country will experience a rise in economic activity, but this rise will be due to the monetary expansion, not to the transfer itself, as Williams defines it. Under a common currency, as between regions of a country or between nations on a pure-specie gold standard, the transfer of reparations is accompanied by changes in the quantity of money, and the familiar process of inflation in the receiving area and deflation in the paying area brings about the real transfer of goods and services. Here, and only here, is there a direct connection between a transfer and changes in employment. Other cases, involving special assumptions about the policies of monetary authorities, though discussed by Williams, play a distinctly subsidiary role in his analysis.

Williams is the prisoner of his assumptions, and they are not very sophisticated. Yet his analysis serves to remind one of important propositions in the theory of flexible exchange rates, and to make one wonder whether we have not been led, by treating fixed exchanges as the typical if not the general case, to have monetary expansion and contraction buried in our assumptions and never brought to the surface, when really such movements may be crucial to our conclusions.

The book should get one plus and one minus on matters of exposition. Williams relies heavily on complicated systems of graphs rather than on verbal or mathematical analysis, and constant reference to his charts became tedious to this reader. On the other hand the style is lucid and highly readable, and scattered through the pages are apt references to recent experience and pithy, almost aphoristic judgments on matters of wide interest. Let me illustrate and close by quoting Williams' comments on the International Monetary Fund:

> An International Monetary Fund to help stabilize exchange rates has been widely advocated, and one is now in operation. One of its functions is to set fixed rates of exchange, and then revise them from time to time, but only at long intervals and in the face of obvious necessity. The effect is to make the rate change suddenly and in big jumps instead of slowly and little by little. Is this what we really want? The big jumps come far apart, to be sure, but the very size of the jumps in rates may well do more harm than any amount of slow continuous drifting of the rates. The advocates of steady rates say it is hard to close a business deal if rates are rising or falling, even though slowly; but it is even harder to close a deal if rates, though steady today, threaten to jump a long way tomorrow. Since the risk in foreign exchange can be avoided without resort to fixed rates, nothing is to be gained by fixing them as the Fund does. . . . If [a pegged] rate breaks down, it can move only in one direction, and foreign traders are seldom in doubt as to which direction this is. Consequently, whenever they cannot hedge their holdings of foreign exchange, . . . one party to the trade knows that he stands a chance of suffering a serious loss, with no chance of making an offsetting gain. In a free market, however, . . . both parties to a trade feel that their chance of gain is equal to their chance of loss. Likewise, they feel that any fluctuation that does occur is likely to be small. With a pegged rate of exchange, on the other hand, any fluctuation that does occur is likely to be large, with the result that one party to the trade may suffer a crippling loss. For this reason foreign traders do not like a pegged rate (pp. 238-39).

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Business Administration

Productivity Accounting. By HIRAM S. DAVIS. (Philadelphia: University of Pennsylvania Press. 1955. Pp. xii, 194. $5.00.)

This book, by an industrial economist who is the director of the Department of Industrial Research, Wharton School of Finance and Commerce of the

University of Pennsylvania, is not so much a work on accounting as it is a description of a statistical technique for measuring the productivity of an enterprise. As the author himself states, "the only justification for giving the name 'productivity accounting' to the method proposed in this book is that it is grounded on basic accounts of a firm, and like usual business accounting deals with all inputs, although in an economic rather than in a financial sense."

The measure proposed is the ratio of total output during an accounting period to the total economic costs incurred to produce that output. Both output and cost are restated in terms of constant prices. The method pursued is to analyze in great detail the financial statements of an actual business, disguised sufficiently to conceal the firm's identity but still reflecting the results of its accounting process as conventionally followed. An illustrative application to this firm of "productivity accounting" is presented first; then follows a lengthy discussion of the theoretical and practical difficulties involved, after which various uses of the calculations are presented. These uses are grouped under five main headings, namely, (1) as a measure of the efficiency of a firm as a whole, (2) as one means of analyzing past performance, (3) as part of the budget control of current performance, (4) as a means of preparing common-price financial statements, and (5) as a device to measure the initial distribution of the benefits flowing from a change in productivity.

Productivity is broadly defined as the "change in results obtained for the resources expended," and consequently includes shifts in the output-input ratio resulting from (a) changes in the production process, (b) changes in methods of using existing processes, (c) changes in the "mix" of input or output, and (d) changes in both the rate and scale at which existing processes are utilized. Specifically, the financial statements of a "given" year are compared with those of a "base" year by restating the recorded dollar amounts of output and input in the given year in terms of base-year prices. The ratio of output per dollar of input for each year is then calculated. The change in the ratio between years is the measure of the change in productivity. This procedure can obviously be extended to the data for a series of years or to a comparison of budgeted with actual figures.

The classification of output follows the familiar accounting and statistical categories of types of product, *e.g.*, commercial grades of rubber, textiles, etc. Input is composed of (1) labor and management, (2) materials, (3) supplies and business services, (4) capital goods (depreciation), and (5) investor input. Each of these categories can be subclassified in specific cases, or analyzed separately, depending upon the objective of the analysis.

The author recognizes clearly that revaluation of output and input in terms of constant prices (*i.e.*, the actual prices prevailing in some base period) means a rating of the component items in terms of their market importance in the base period. As a consequence, the measure of productivity change he obtains is a measure of the change of output per unit of input "in terms of the existing value system under which the production occurs."

This book is excellent for those who wish to use accounting data as grist

for a statistical mill whose output is data on productivity in industry. The practical and theoretical problems are certainly completely catalogued, and, for the most part, satisfactorily handled. What the author never makes entirely clear is why any business management should prefer a change in productivity to a change in profit as a signal to speed up or slow down. Perhaps the increased use of electronic computers in business will enable management to obtain both kinds of data so that a choice between them will not have to be made.

MAURICE MOONITZ

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Les commerces de détail en Europe occidentale—Essai de comparaison internationale de la productivité des magasins et du travail commercial. **By JEAN-MARCEL JEANNENEY. (Paris: Armand Colin. 1954. Pp. 73. Fr. 300.)**

This study of *Western European Retailing—International Comparison of the Productivity of Retail Outlets and their Personnel* is the first publication of the "Service for the Study of Economic Activity and Social Conditions," an institute created in 1952 by the "National Political Science Foundation" and directed by the author, Professor Jean-Marcel Jeanneney of the Paris Law School.

Using measuring techniques developed by the U.S. Bureau of Labor Statistics and adapted to the distributive trade by the Organization for European Economic Co-operation, Jeanneney attempts a comparative evaluation of retailing productivity in eleven European countries.

With a view to detecting the probable causes of mediocre retailing productivity, the author analyzes eight ratios: the number of food stores, the number of other retail outlets, the number of their respective employees, in terms of population, and annual sales volume.

Great differences in retailing productivity are indicated by the various ratios. If equal weight is assigned to them all, the eleven countries rank, in descending order of productivity, as follows: Sweden, Switzerland and Italy, Denmark and Norway, Great Britain and Germany, France and Austria, the Netherlands, Belgium.

Several attempts are made to explain the differences. Does retailing productivity depend upon geographic factors, such as density of population or degree of urbanization; or upon economic factors, such as the ratio of farmers to total population or the use of industrial power? The only close relationship indicated by the measurements links less-than-optimum retailing productivity to a low standard of living and, particularly, to a low wage structure. Legislation restricting the establishment of new retail outlets, of course, protects inefficient operation.

Despite admitted limitations of the statistical techniques used, this first attempt at determining the productivity of distribution appears extremely interesting. While much remains to be done, the experiment explores a new, difficult, and highly important field. Similar studies should be undertaken of the productivity of wholesaling finished products, and of the productivity of

the process whereby raw materials, component parts, and other producers' goods are marketed in industry. If it is true that productivity of the over-all distribution process depends primarily upon its accurate synchronization with the accrual rate of consumer demand, then studies of this type should be valuable in spotlighting areas in need of improvement, and in facilitating remedial action.

ERIC D. BOVET

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Industrial Organization; Public Regulation of Business

Grossindustrie und Gesellschaftsordnung. Industrielle und Politische Dynamik. By HERBERT VON BECKERATH. (Tübingen: J. C. B. Mohr (Paul Siebeck). Zürich: Polygraphischer Verlag AG. 1954. Pp. xii, 278. DM 19.60.)

The dominance of the large enterprise in industry has attracted much attention for many decades. Of economists it can perhaps be said that the large industrial enterprise has been a center of attention for those concerned with economic history and organization, with labor problems, with reformism and socialism, and with such concrete issues of public policy as the maintenance of competition. Economic theorists on the other hand have dealt with big business only recently and with some awkwardness and discomfort. Much the same can be said of those economists who have discussed general economic policy at high levels of abstraction. In his new book Herbert von Beckerath sets for himself a comprehensive problem, that of the meaning and consequences of modern large-scale industry for social structure and development, for the economy as a whole, for politics, and for public policy.

Part one of the book, which is introductory, announces the limitation of the scope to large enterprises in the manufacturing industries. Inasmuch as the author essays evaluations of the political and social aspects and consequences of big business, this indeed must be counted as a shortcoming. Big business is more than big manufacturing, and in the United States particularly, the large nonmanufacturing enterprises, being predominantly private, present public policy issues different from those which have existed in Europe. Large corporations in such fields as banking, insurance, transportation, and communication receive scarcely a mention from von Beckerath; unions are viewed only in the light of their relations to and effects upon the manufacturing industries.

Parts two and three give a sketch of the history of industry in western countries since 1875. Parts four and five are devoted to general descriptive materials on business organization and management, raw materials supplies, sources of capital, labor markets, and product markets. Part six is on public policy and the large enterprise. Here the breadth of Beckerath's knowledge and interests gives the reader interesting contrasts and comparisons among the countries of the West and among general types of economic policy. But here, as throughout, his treatment of each topic is brief, and in parts, superficial.

Because international comparative analysis of the relations among society, state, and industry has not often been undertaken, von Beckerath's comprehensive view is valuable for its insights. He is in a position, as few have really

been, to view in long and in minimally distorted perspective the political economies of both sides of the Atlantic. The contrast between the effects of public policy on the structure of industry in America and Western Europe he handles well. Likewise, the author's characterization of the main types of economic policies, with their political and philosophical orientations, is skillful in the light of his purposes. Beckerath's own point of view can perhaps best be described as conservative in the sense in which that term has appeared in recent political literature in this country. Public policy, he believes, faces the task of preserving and increasing the contribution of large industrial enterprises to economic progress, while maintaining freedom (especially that of the superior people), and at the same time following the dictates imposed by the politics of the age, namely, those of economic stability and the defense of western civilization.

This is not a book to recommend to the specialist, except that some might find in the many references to the French and German literature a source of help. The work is intended as a text and for the general reader. For this purpose its breadth, judicious tone, and its very brevity should make it valuable.

D. S. Watson

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Public Utilities; Transportation; Communications

Transportation and Communications. By G. Lloyd Wilson. (New York: Appleton-Century-Crofts. 1954. Pp. xi, 757. $6.00.)

The transportation industry, despite its great age and maturity in many respects, is still growing and changing, so that a new textbook is imperative every few years. Therefore, this book, by the chairman of the transportation and public utilities department of the Wharton School of the University of Pennsylvania, is a timely arrival. Since transportation textbooks are essentially factual presentations of the transport industry—its history, facilities, practices, and problems—they cannot differ radically in content, and must be judged on the basis of clarity, logic of arrangement, and relative emphasis.

Those well acquainted with the field of transportation will immediately recognize in this book a strong family resemblance to the long-popular Johnson, Huebner, and Wilson text *Transportation—Economic Principles and Practices*. The general arrangement is the same; what might be termed the *vertical* approach, that is, each of the various means of transport is considered separately in all its aspects. Other texts may follow the alternative approach of taking up various functional aspects of transport, such as rates, regulation, etc., and considering each of these with reference to all forms of transport. This too has its advantages, but many of these texts, and especially those which have tried to combine both approaches, have frequently bogged down in confusion and repetition.

A unique feature of this book is the inclusion of five chapters on the communications industry—telephone, telegraph, and radio. This is an area, closely related to transportation, which is all too often entirely neglected in college curricula in business administration.

One criticism of this book is its occasional lapse in presentation of the latest statistical data available. For example, in one of the introductory chapters, a table giving the distribution of freight and passenger traffic among the various agencies of transport uses 1939 figures, although later in the book there is a discussion of the relative shares in 1952. In the chapter on passenger service, reference is made to the federal transportation tax as 15 per cent, but seven pages later the reduction of this tax in 1954 to 10 per cent is recorded (though a typographical error makes the date 1944). Slips like these, while annoying, are not too serious, since they are few and any competent instructor can make the necessary corrections.

The important fact about this book is that it is eminently teachable. Instructors who wish to rely heavily upon a text will find that it contains ample material for a semester course, while those who prefer to create their own course will find the book an excellent framework upon which to hang their own material. It will serve equally well as a text for the only course in transportation, or for a basic course which is to be followed by advanced courses on specialized areas of transport.

Although transportation is a subject in which it is very difficult if not impossible to divorce the theoretical from the practical, it should be pointed out that the emphasis in this text is somewhat heavier upon the practical approach. For instance, in the discussion of railroad rates there is slightly more emphasis upon *what* rates are than upon *why* they are what they are; and in regulation more space is devoted to the provisions of the regulatory laws than to the philosophy of utility regulation. In short, the author has evidently tried to describe what the *user* of transport needs to know about the American transportation system.

R. Hadly Waters

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Industry Studies

The New England Fishing Industry—A Study in Price and Wage Setting. By Donald J. White. (Cambridge: Harvard University Press. 1954. Pp. xvii, 205. $4.00.)

Apart from a few dedicated souls in government agencies, professional economists have shown remarkably little interest in the fishing industry. Yet its history of bitter internal disputes and repeated antitrust actions provides ample evidence of the need for analysis of both market structure and market performance. Dr. White has undertaken this task with respect to the important fresh and frozen sector of the New England fisheries centered in Massachusetts and Maine. Though the analysis is centered on the seriously disruptive conflicts among fishermen, vessel owners, and buyers, it is prefaced by a concise summary of the basic structure of the New England dockside markets and concludes with a series of specific policy recommendations.

The author is obviously thoroughly familiar with the technical and organizational background of the New England fisheries, and his delineation of the proximate sources of their troubles—the interrelationship of prices and labor

compensation through the lay payment device; the pressure of declining fish populations; and the mounting volume of imports—is convincing.

Nevertheless, while this is a useful book of professional calibre, it fails to develop the interrelationship of market structure, behavior, and performance in the precise manner characteristic of the many excellent industry studies produced in what might be termed the Harvard tradition.[1] For example, there is no analysis of the degree of concentration among waterfront buyers or of the possibility that coordinated purchasing policies could develop and persist without overt collusion. This is vital to an understanding of continued conflict among dealers and fishermen, since—contrary to White's assumptions—the supply function of primary producers in the fisheries is typically inelastic to price decreases in both short and long run.

Perhaps because of the brevity of the book, a number of its conclusions are inadequately supported. There are, for example, better reasons for rejecting a price support program in the fisheries than that it would result in "putting the union at the mercy of the government" or "undermining the New England industry's will to self-improvement." And the implication that marketing margins are excessive is supported only by the fact that they are high.

White's recommendations with respect to the futility of import restrictions, the need for basic research on both biological and economic fronts, and the desirability of expanding and stabilizing the demand for seafoods are sound. But the key question of the establishment of orderly and competitive pricing procedures at dockside will not be resolved by his suggested changes in the mechanics of pricing, though they are sound. Until the bases for recognized interdependence of buyer purchasing policies are eliminated the turmoil on the waterfront is likely to continue; and this is hardly touched upon in the book.

James A. Crutchfield
University of Washington

Land Economics; Agricultural Economics; Economic Geography

World Population and World Food Supplies. By Sir E. John Russell. (London: George Allen & Unwin Ltd. 1954. New York: Macmillan. 1955. Pp. 513. $8.50.)

The central purpose of this work is apparently to survey the nations of the world with respect to "what each is doing to increase its contributions to the world food market or to reduce its dependence thereon" (p. 6). The method is to show, by analysis of the history of current practices in agricultural organization and technique in each of several countries, those roads to enhanced food output which may be followed in others somewhat similarly situated especially as to climate and soils. Attention is consistently directed to the successive gaps between "freak" yields, achievement under experimental conditions, outputs of the best farms, and results obtained by average and inferior producers. Ways and means of agricultural improvement and development being the main subject matter, the volume has particular interest for readers concerned with problems of underdeveloped areas. There is a wealth of specific information,

[1] For example, the works of Bain, Markham, Steiner, Alhadeff.

pertaining to specific places, on current practice *vs.* scientific knowledge about irrigation, land reclamation, water conservation, correction of soil deficiencies, use of fertilizers and insecticides, soil and pasture management, plant and animal breeding.

Consideration of the gaps between practice and knowledge in agriculture leads Russell to conclude (p. 7), "the picture that finally emerges is one of tempered optimism." He holds higher expectations of improved food supply for advanced countries than for the underdeveloped ones, for temperate zones than for tropical, for South American tropics than for the African and Asiatic. On food imports for the United Kingdom, he thinks (p. 495) "we may feel hopeful about bread grains, margarine, milk, bacon, pork, and mutton at present levels of consumption, also sugar, fruit, and vegetables. But we cannot rely on pre-war supplies of butter or of beef however much we may hope for them." As for the less advanced countries, he believes (p. 7) that "all can, if they will, find a basis for cooperation with the countries that can supply them [with appliances lacking domestically but needed for improvement of their agriculture] and provide experts teaching how to use them." Apparently his expectations for the underdeveloped areas would be higher if political leaders in those parts of the world showed more evidence of hospitality to capital imports and foreign experts than they do.

Such conclusions indicate that Russell is not greatly troubled by "the population problem," perhaps in part because he restricts his probing of the future to "our time" and says nothing about matters indefinitely remote. He speaks, it is true, in favor of a "sound population policy" for the less advanced countries, India in particular; but the point is made briefly and casually, and what such a policy might be or how implemented receives no discussion at all.

The book is somewhat narrower in scope than its title suggests. Excluded from more than passing mention are the USSR and satellite countries, Western Germany, Austria, Switzerland, Greece, Morocco, Algeria, Tunis, Libya, Ethiopia, Turkey, Arabia, Iran, Mexico and Central America, the Caribbean islands, the Philippines, and a few others. Considering the purpose of giving illustrations of roads to agricultural improvement, omission of Turkey and Greece appears especially regrettable. There is a brief, somewhat perfunctory, introductory chapter on world population numbers and growth, and a longer concluding chapter on trends in world food supplies especially as they bear upon prospects for British food imports. Otherwise the treatment is by geographical areas *seriatim:* British Isles (54 pages); Netherlands, Denmark, Sweden, Finland (54 pages); France, Spain, Portugal, Italy, Israel, Egypt (50 pages); Africa south of the Sahara (135 pages); India and Pakistan (27 pages); China, Japan, Indonesia, Burma, Thailand, Indochina (9 pages); the United States and Canada (46 pages); Australia and New Zealand (47 pages); and Argentina, Brazil, Uruguay, and Paraguay (22 pages). Opinions will differ on the relative merits of the regional analysis. The present reviewer happened to derive least satisfaction from the discussions of Asiatic countries, Spain and Portugal, the United States, and South America; most from the discussions of Israel, Egypt, Africa below the Sahara, Australia, Finland, and Canada.

Although publication was in 1954, the author usually found himself unable to present statistical contrasts of prewar circumstances (acreage, production, consumption, land use, etc.) with circumstances in postwar years later than 1950, sometimes 1951. Commonly the crops of 1952, 1953, and 1954 were far larger, so that in not a few countries where the earlier data suggested deterioration of yield and lower consumption, later information suggests the reverse. Writing today, Russell might well find less reason to temper the optimism of his conclusions than he found two years ago.

M. K. Bennett

Food Research Institute, Stanford University

Labor

Labor-Management Relations in Illini City. By W. E. Chalmers, Margaret K. Chandler, L. L. McQuitty, Ross Stagner, Donald E. Wray, and Milton Derber. Vol. 1: *The Case Studies.* Vol. 2: *Explorations in Comparative Analysis.* (Champaign: Institute of Labor and Industrial Relations, Univ. of Illinois. 1953, 1954. Pp. xlii, 809; x, 662. 2 vols., $15.00; each $10.00.)

Economic books should be accurate and thorough, but, once ready or approximately so, they should be rushed on the market. The reasons were suggested years ago by Richard T. Ely in defense of his own policy of prompt publication. They are, essentially: that the world has great need of all the enlightenment that can be offered in this field; that the product is highly perishable; and that some other chap may beat you to the draw. The present study, after the manner of elephants, has had a long period of gestation. The interviews and research upon which it is based covered the three years from 1948 to 1950, inclusive; the first volume, which is primarily a case-book, is dated "1953," but it had to stand by until its somewhat less hefty brother could appear at its side late in 1954; and now both are being reviewed in 1955. We cannot at this distance know all the difficulties, mechanical, controversial, and otherwise, that may have been encountered. Certainly, there has been no undue economy of time or space, or of thought and effort. The authors may well declare that they are writing for the future and not merely about the past.

This is an example of cooperative research and analysis among the social sciences; and not the least interesting feature for the profession itself is the brief account toward the very end by Chalmers of how it worked. The three disciplines immediately concerned were economics, sociology, and psychology, with political science on the side-lines. We are told that the participants first had to educate one another, and this may have been part of the time-consuming process which would not have been so necessary in olden days when an academic chair was more in the nature of a settee. We are not told which one of the triumvirate finally ruled the roost; but, judging from the fondness throughout for certain modes of expression, the emphasis upon methodology, and the use of such mouth-filling terms as "accommodation," "quantification," "circular influence," and "norms," it appears that it was not the economists,

and may have been the sociologists or their near relatives, the institutionalists. Yet there can be no doubt but that labor relations offer scope for all methods and viewpoints, and that such a newer synthesis or integration is highly desirable. We have Sir John Clapham's authority for saying that "it is at the overlapping margins of disciplines and sciences that the most important discoveries are usually made."

Some disappointment may be felt that we are given so much information about industrial affairs in an unidentified city of 50,000 or upwards, and that the names of companies, labor leaders, and historical characters are so carefully concealed. But perhaps we have become somewhat accustomed to such anonymity through parallel studies like "Middletown," "Yankee City," Steeltown" and others, which are sometimes here referred to, and can understand that confidentialness is the price that must be paid for freedom of expression and fullness of data upon a live, current situation.

The end-purpose of the study was to arrive at certain positive criteria or scales for measuring labor-management relations within a given community, industry or plant, whether they are to be regarded as good, fair, or poor; to determine the principal factors or influences bringing them about; and to show how the different features or variables are correlated. The community chosen is a medium-sized city in the Middle West with a considerable variety of industries but a relatively homogeneous population with respect to race and culture. It is fairly typical of its area but not necessarily of all areas. The industries selected for special investigation were five in number, in three cases represented by two different establishments or concerns each: a grain-processing company with quite a long history; a plumbing-supply or metal products plant; building construction firms; garment factories making house-dresses and employing chiefly women; and the local and over-the-road trucking business—making eight different units in all.

The goals or tests as to the level of success achieved in each industry and establishment are mainly three: (1) the present economic status of the workers as shown in average hourly pay and annual earnings; (2) the extent of union influence as shown by participation in the decision-making process on various phases of the business (wages, hours, accidents, seniority, time study, etc.); and (3) the attitudinal climate as registered in the frequency and bitterness of conflict or the existence of a spirit of cooperation between employers and employees. Among the determinants of successful industrial relations are given such factors as the attitude of the community toward unionism at different periods and the extent to which union leaders are represented in civic affairs; the influence of national psychology and legislation under the New Deal; the baneful effect of absentee ownership as contrasted with a neighborhood feeling; regional as compared with local leadership of labor; the change from the paternalistic or the captain-of-industry to the more professional type of management; the importance of business prosperity; the proportion which labor cost bears to total cost, and so on.

Perhaps the least revelatory portion of the analysis in Volume II is that on the "determinants" in Chapters 8 and 9, where so many of the hypotheses

as to what makes for greater or smaller union influence or for improvements in economic status seem axiomatic and not really necessary of proof. It is true that in our classes we often shape up hypothetical questions the answers to which are already known, just as an exercise for the students. But it seems rather unprofitable in a scientific treatise to devote pages to demonstrating that hourly wages tend to be higher where the regularity of employment is low, or that "If the skill level is higher, the hourly earnings tend to be higher." Adam Smith said most of these things in 1776 and no one has ever seriously disputed them, always remembering to add, "other things being equal."

It is much too late to give advice as to how the avoirdupois of this treatise could have been reduced. That would seem to have been eminently desirable both from the standpoint of publishing costs and for the comfort of the reader. The plan of treatment may be what is commonly called a spiral one or the method of approximations. But surely we are conscious of returning again and again, as in a nightmare, to the same material stated in almost identical language. Summaries and conclusions at the end of each chapter and division, and at the end of Volume II, are so frequent and complete that any passenger who dropped off at a way-station to get a sandwich or a newspaper would have no difficulty in jumping on again when the last car came by. In fact, it might be just as well to begin with Milton Derber's "Summary of Findings" in chapter 16 where there are ample cross-references to all previous discussions of each topic, and then "proceed backward" from there.

WARREN B. CATLIN

Bowdoin College

The French Labor Movement. By VAL R. LORWIN. (Cambridge: Harvard University Press. 1955. Pp. xix, 346. $6.00.)

This reviewer heartily hopes that the many persons now engaged in comparative labor studies will use Professor Lorwin's *The French Labor Movement* as a model of organization and balanced presentation. Few American writers, of course, will bring to such a study the long familiarity that Lorwin has with his subject. The French labor movement has been in the Lorwin family for a long time. Val Lorwin's father, Lewis L. Lorwin, published his *Syndicalism in France* forty years ago.

The first half of this book is devoted to describing the rise of French unionism, a product of the unique social history of that land, its syndicalist origin and its later capture by the Communists. It was, ironically, the individualism of the French workers who refused to give either funds or authority to their union leaders that kept their organization weak, thus easy prey for the well-disciplined Communists who moved in at the time of liberation.

Lorwin describes how the bright hopes that French labor held at the war's end have been dashed, the Communists in control using the major federation, the Confédération Générale du Travail, to further Soviet policy and in disregard of the interests of labor and the French economy as a whole. Yet even the CFTC, the Christian Federation, and the *Force Ouvrière,* the group that broke from the CGT—both of them closer to the more immediate objectives of the

concrete wage earner, not the abstract "proletarian"—have been unable to rally the kind of day-to-day support a trade union movement needs for growth and effective action.

Although the Communists are in control of the apparatus of the CGT, they are no more successful than their predecessors or their rivals in mobilizing the membership for their own objectives.

That collective bargaining as Americans know it hardly exists in France is brought out in the second half of the book, where industrial relations and the role of government in labor affairs are described. The well-organized employers, who view their markets as inelastic, determine the area and scope of such bargaining as exists. The competition among the federations and the apathy of the workers make this task easy.

As long as the major segment of the French labor movement continues to treat "bourgeois" government as its principal enemy, it will go on depriving itself of the alternate, governmental route for an amelioration of the workingmen's condition of life as well as for upbuilding the bargaining power of its unions.

This excellently written book has added usefulness for the teacher and student because of its complete bibliography, chronology, and appendixes.

EDWIN YOUNG

University of Wisconsin

The Union and the Coal Industry. By MORTON S. BARATZ. (New Haven: Yale University Press. 1955. Pp. xvii, 170. $3.75.)

The first three chapters of this book present a description of the market structure of the coal industry and of its most important producing area (Appalachian Region) followed by a historical review of "significant developments" of the sixty years closing in 1950. Chapters 4 and 5 are outlines of "policy objectives" of the United Mine Workers, and of the "political aspects" of union action in its internal operation, as well as in its management-government relations. The last four chapters deal with the effects of union activity upon wages and market competition (both interregional and interfuel) with a concluding appraisal of these effects.

The long first chapter furnishes the foundation. It is an old familiar framework consisting of two elements—one is the view that "a distinguishing characteristic of the industry is the vigor of price competition among many firms," and the other, that "union-enforced 'floors' . . . have curbed the use of wage cutting as an instrument of competition." The view of the industry as an almost perfect example of "pure competition" (p. 27) may have been an acceptable basis for Lubin's[1] study of collective bargaining in the 'twenties, but Parker[2] recognized its oversimplified character in 1939-1940. The "pure competition" view was never more than symbolically correct, and it became seriously defective after 1941 when unionism encompassed the steel companies' "captive mines." No mention of the significance of standardization of wage

[1] I. Lubin, *Miners' Wages and the Cost of Coal* (New York, 1924).

[2] G. L. Parker, *The Coal Industry* (Washington, 1940).

scales in this market-sheltered segment of the industry occurs in the first chapter, but later efforts to repair the defect constitute the most original contributions of the study. Had some of these been supported by convincingly presented fresh evidence, they might have counted as strokes of real craftsmanship. Unfortunately these efforts to deal with consumer-owned tonnage come too late to do more than introduce mere fragmentary bits of rare materials into a framework of pure competition where they have no place (pp. 28, 30, note 7, 37-38, 80, 82 and 141). Not only do the materials fit the structural layout very badly, but they also show marks of inept handling. Thus in considering the union-reduced working time of 1949, the author writes, "This was an attractive proposition to many firms, but it was resisted strenuously *by the captive mines—all of which could sell a full week's output* (p. 141, reviewer's italics). If we skip the very real question of whether it is appropriate to refer to the captive mines as ever "selling" anything in a conventional sense, there remains the observation that the statement simply is not correct as to the facts. It was based on a newspaper account (note 9), and a little investigation of the reports of the Bureau of Mines would have shown the author the inaccuracy of his statement. Captive mines of steel mills are the principal suppliers of the coke-making furnace plants. During all months of 1949 furnace plant coke reserves were approximately twice as great as in all the corresponding months of 1948.

The book contains many illustrations of the misleading use of the common materials of economic analysis. The course of wages during the period 1935-1948 is discussed with almost no consideration of changes in general price levels during the period. Neither does the section dealing with the elimination of regional differentials in wages take into account that this movement coincided in timing with similar developments in other industries;[8] perhaps something more than unionism was at work. Moreover, the text may give the impression that union scales have obliterated all regional differentials, as there is no recognition of the fact that district agreements still permit noticeable differences in area rates.

Also the casual five-paragraph treatment of the new institution of the U.M.W. welfare fund (pp. 115-16) is another illustration of inadequate consideration of important facts. Reference is made to the 1948 rate of 20 cents per ton without any mention that this was raised to 30 cents in 1950 and again to 40 cents in 1952. At the time the author was writing his text (early 1954, see p. 140) the sag of coal prices had made the then current rate represent over 10 per cent of realization-at-the-mine to many operators, an amount too significant to be dismissed with indifference.

This sort of loose procedure can hardly lead to any reliable conclusions and the frail evidence presented cannot support "an appraisal." Hence in the final chapter, with scrupulous documentation it is true, refuge is taken in summarizing views advanced earlier by other writers. With its substantial reliance upon the ideas of Arthur Ross, Henry Simons, Lloyd Reynolds, and C. E. Lindblom, this final chapter could have been written, save for minor changes,

[8] See W. S. Woytinsky et al., *Employment and Wages in the United States*, esp. Ch. 41, (New York, 1953).

without any reference to the earlier portions of the book. Thus the reader is left with very little fresh enlightenment on "The Union and the Coal Industry."

C. L. Christenson

Indiana University

An Introduction to the Study of Industrial Relations. By J. Henry Richardson. (London: George Allen and Unwin Ltd. Distributed by Macmillan in the U.S.A. 1954. Pp. 442. $5.25.)

From a rich background of experience in Great Britain and abroad, Professor Richardson of the University of Leeds has written what he terms a comprehensive survey of the field of industrial relations. Although the aim is not stated in terms of any one particular industrialized country, the book leaves the impression of being a Briton's view of policies and practices in his own country, with only oblique references to America and other countries. The American reader's interest will more likely stem from a desire to make comparisons of viewpoints than from a search for new or old knowledge challengingly presented. He will be interested for example in perceiving the extent to which our techniques in personnel administration find their parallels in Great Britain while our philosophies on collective bargaining and state intervention do not.

It should be pointed out at once that Richardson's definition of a comprehensive survey is not the same as an American's definition of a textbook in labor economics and labor relations. Thus when Richardson turns to the subject of wages, he deems it sufficient for his purposes to concentrate on the wage-setting mechanisms and on the key arguments influencing the wage settlement. He does not analyze in any detail the economic significance of the bargains arrived at, nor does he relate the wage-setting process to distributive theory in economics. In general, Richardson's survey stops at a description of institutions and techniques, and does not push on into examining the consequences flowing from those institutions and techniques.

In five separate areas, the author describes contemporary institutions developed by men in pursuit of better relations between employer and employed and better standards of living for all. Beginning with relations at the workplace in the face-to-face meetings of worker and boss, he treats the standard subjects of personnel administration. From this, he moves on to introduce the institutions of unionism and of collective union-management relations. Next he allots a section to the problems of wages and hours as those problems manifest themselves in the private sectors of the economy. The role of state intervention in the wage policy, conciliation, and social security fields carries him on to the national level. From there, it is only a short step to the international sphere and to a brief description of international labor organizations.

The tour here is a quick one and the guide is well informed. Yet there are two related problems about such a tour and Richardson effectively solves neither of them. First, there is the guide's temptation to hold us too long in one place that is of special interest to him but that is not explained to us in such a way as to arouse our interest. For this reader, too much time is spent

for example on a rather detailed description of the Bedeaux system of work measurement without developing those basic principles which add understanding as opposed to skills. At such points, the guidebook takes on the air of a manual. If one were to use this book as a classroom text, he would be at a loss to provoke discussion that lifted the students' sights beyond the details of technique and toward the economic and sociological implications of the Bedeaux system.

The other problem flows directly from the first one. The guide then must make up for lost time and needs to rush us past other spots with a few broad generalizations. With Richardson, such generalizations as are sprinkled throughout the book invite dissent in many instances and further clarification in others. Two examples: "It must be emphasized that there is not the slightest objection to time studies if the method is properly used. Indeed, for suitable work time studies are of value both to management and workpeople, and if standards of output are fixed by mutual agreement as they usually can be they remove a cause of friction and lead to more harmonious relations in the undertaking" (p. 73); and, "In some countries, *e.g.*, the United States, misunderstandings are still the cause of bitter costly conflicts, but in Britain the prospects for constructive advance are favorable" (p. 159).

There is furthermore an ambiguity of purpose which shows through in these pages. This takes the form of occasional lapses from objective description into policy prescription. My quarrel is both with the appropriateness of including any advice at all in such a survey and with the wisdom of the particular advice given here. Here are two instances of these prescriptions: "Clerical work has long had a higher prestige than many manual occupations—because of higher social status. Where this distinction is merely snobbish, it should be broken down" (p. 102); and, "One road to greater harmony in industry would be for workpeople to become part owners of the capital they use and to have a more direct interest in the profits of industry" (p. 429). In a book otherwise notable for dispassionate description, these passages are strangely out of place.

John R. Coleman

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Population; Social Welfare and Living Standards

A Theory of Economic-Demographic Development. By Harvey Leibenstein. (Princeton: Princeton University Press. 1954. Pp. xi, 204. $4.00.)

Professor Leibenstein concludes his book with the following remarkable sentence: "As a consequence it appears that to attempt to suggest means of testing propositions developed in this essay is at present otiose." This is true, he feels, because (1) scientific propositions can be tested only if they lead to predictions which then turn out to be true or false. (2) These predictions can not be tested because the variables discussed are not measurable—either for lack of statistics or lack of techniques of measurement. (3) Finally, by the time the statistics and techniques are perfected, the author feels that a more adequate theory of economic-demographic development can be evolved.

Such modesty indicates that instead of laying claim to having slain the

dragon of Malthusianism, Leibenstein presents himself as something of a reluctant dragon. What he is here saying is that his model for economic-demographic development has not been—and should not be—subject to empirical analysis and verification. Is it therefore useless? Evidently he does not think so and, I am glad to say, neither do I.

Needless to say this is a work in pure theory—a model highly simplified but apparently, like many models, complicated enough to defy empirical verification. Basically this model sets the rate of population increases against the rate of accumulation of capital in Malthusian countries and attempts to estimate the "critical minimum effort" required to pull the "system" out of its "stall" on dead center.

It sees the "Malthusian trap" in the undeveloped countries as tending to a stable equilibrium, with the major variables at an extreme value consistent with the survival of the population. Thus (1) population size tends to be at a maximum in relation to given resources, technology, and economic organization; (2) per capita income tends to be at a minimum consistent with population survival; with (3) birth and death rates at the maximum consistent with survival.

If we inject into this system given increments of income, what will happen? Will the increased average income lead to population growth, thus lowering income? Or will increases in average income lead to more saving, thus increasing the rate of capital accumulation faster than the rate of population increase? Here one has a choice of two models. (1) The rate of population growth can be regarded as a monotonic increasing function of average income up to a point beyond which the rate continues at its maximum value; or (2) it can be postulated that above a certain level of average income, the rate of population growth will decline.

In this moving series of equations, what is the "critical minimum effort" necessary for the destabilization of the Malthusian equilibrium? Under certain conditions attempts to escape Malthusian stagnation will—when they fail—make the situation worse. For the average income-gain multiplier to be larger than the population multiplier, the investment for example should be labor-elastic in character. Thus it is better to build a railway system than to invest in the production of agricultural machinery which at the onset will displace labor. Later, however, fewer workers must grow more food to supply urban industrial populations.

The first explanations are developed at the "macro" level of the total systems—economic and demographic. Ultimately, however, the analysis must get down to the "micro" level; that is, it must consider individual choices, that is, the decision-making process in terms of both the technological and biological constructs involved. Here the analysis attempts to integrate the economic order with the *mores* and social values involved in the high fertility complex.

This represents a complex system hardly more amenable to the symbols, curves, and equations of a certain type of economic theorist than to the conventional verbalizing of the orthodox cultural demographer. No model can

include all the variables involved in the real situation. Actually the more "micro" the model, the more variables that are left out. How many can be left out and still give us a model which is functional or "workable"? Aye, here is the rub; it leaves both the author and the reviewer feeling somewhat otiose.

The volume ends with a chapter on optimum population theory which adds little either to the model or to the concept of the optimum. This book is distinctly not the cup of tea to which demographers of the sociological variety happen to be addicted. Nevertheless, it is something which required doing. It is also something which for the good of my empirical little soul, I am glad I have read. I do predict, however, that if—and when—some of the backward countries break out of the Malthusian trap, no one will refer to Leibenstein's book as having had anything to do with it. This will be unfortunate and if I am around at the time, I hope to remedy the oversight.

RUPERT B. VANCE

University of North Carolina

Employment Expansion and Population Growth—The California Experience 1900-1950. By MARGARET S. GORDON. (Berkeley and Los Angeles: University of California Press. 1954. Pp. xiii, 192. $3.50.)

Dr. Gordon's monograph continues a series of historical studies of California's population and economy sponsored by the Institute of Industrial Relations at the University of California (Berkeley). The major emphasis of this study is on the relation of inmigration to economic growth in the first half of this century. In this context, the author examines the degree and timing of changes in the size and structure of the population and in the levels and structure of employment; comparisons are made with national trends, and differentials in income and unemployment between the state and the nation are analyzed. In the course of interpreting the interrelationships of population and economic growth, a number of interesting hypotheses are tested.

A major finding of the study is that the state's highest rates of inmigration were associated with rapid expansion in employment in California, and the time periods concerned coincided with those of rapid expansion in the nation. It is recognized that the reasons for migration to California may be noneconomic as well as economic in nature, but the evidence suggests that the timing of migration is strongly influenced by the levels of job opportunity prevailing in the period concerned.

Historical data on unemployment are also used to support the view that net migration to California is sensitive to changes in the rate of economic expansion. The only instance of a serious maladjustment between the two was found in the persistence of a relatively high rate of unemployment in the state during the years following the second world war. After comparing migration waves to California and to other selected states, the conclusion is reached that migration waves may be related to secondary secular swings in the rate of growth in the national economy.

The author finds no evidence that extensive inmigration to California has led to a decline in long-standing wage differentials between California and

other regions of the country. A recent decline in per capita income in California is attributed not to a decline in wage income but to a change in the structure of the population, namely, a decline in the relative underrepresentation of children, and to a decline in the relative importance of the extractive industries in the economy.

Despite an increase in manufacturing employment in recent decades, this report indicates that the structure of employment in California has been remarkably stable over a half century and that the state continues to have substantially higher proportions of workers than the nation in the distributive and service industries. Most of the manufacturing industries that have flourished in California have been "market-oriented" or owe locational advantages to the state's natural resources, including climate. As a result of the most recent developments, California's economy has become increasingly dependent on the level of spending for national defense.

Dr. Gordon finds that the hypothesis that California's economy is less vulnerable than the nation to cyclical changes can not be adequate tested from the available data. Employment in the state is found to be subject to relatively high seasonal variation in some industries that employ a substantial proportion of the labor force. Moreover, lags in fluctuations in the rate of inmigration compared with employment changes have occasionally led to a relatively high volume of frictional unemployment.

The evidence with respect to the effect of population growth on the pattern of industrial expansion is inconclusive, partly because of instability in the development of certain industries and persistent declines in the national and regional demand for labor in others. A methodological problem is raised by this part of the analysis. Apart from the validity of the assumption that all types of employment may be expected to expand with population growth, this reviewer questions the use of ratios of the rate of change in one to the rate of change in the other as a major indicator of trends, because ambiguous figures result if one rises and the other declines.

The major findings of the study are not affected by this methodological defect, however, and the report will be of interest to all regional analysts and to economists concerned with the geographic impact of national developments. More importantly, this is one of a very small number of regional studies that attempt to test important aspects of economic and social theory about economic growth and migration.

Gladys L. Palmer

University of Pennsylvania

Hungry People and Empty Lands. By S. Chandrasekhar. (New York: Macmillan. London: George Allen and Unwin Ltd. 1954. Pp. 306.)

This is basically a "tract for the times." Like many predecessors, it stresses the urgency of the population problems in underdeveloped areas, and presents a policy to deal with those problems. The thesis is simple and is no longer original. If the present rate of population growth continues in such countries

as India and China, the growth will swallow up any potential gains from industrialization and agricultural development. This will make the achievement of higher standards of living in those countries impossible, and could lead to such explosive internal pressures within the countries that demands for new land would become irresistible and war would result. To avoid these contingencies the author advocates a series of policies laying stress upon migration to currently "empty" lands, accompanied by birth control, as well as the usually advocated measures of industrialization and agricultural development.

The book deserves praise for emphasizing the possibility of migration. It examines the population-absorbing capacities of those countries that the author considers would be able to profit from large-scale immigration of peoples from the "crowded" countries. However, the book has many weaknesses. The major one is that the author sacrifices factual support and close reasoning for a supposedly popular and frequently weak level of argument. While the reviewer sympathizes with the author's position and agrees with him as to the urgency of the problem, he is unable to accept many of the arguments presented. A major argument, frequently repeated in the book, is that the pressure of population upon land is the basic cause of war. Unfortunately the author cites as strong supporting evidence Hitler, Mussolini and Japanese military leaders. The author obviously has failed to distinguish between rationalizations for policies and the causes of the policies. Furthermore, when the author states that even if the argument may not hold in "fact" it would be equally valid if it held psychologically, he is making the argument one that it is impossible to disprove. It cannot be put to any test and therefore is not valid as a scientific argument. In fact the cases of Germany, Italy and Japan may show that even with relatively high and increasing living standards countries may be induced into war by the sight of *higher* standards among other countries, rather than by their own absolute level of poverty.

This same weakness characterizes the discussion of the "empty" lands. The reviewer agrees with the criticisms of racial limits to immigration, especially as the author himself recognizes that any migration on a large scale must be accompanied by birth control among the migrants and in the "home" country if it is to be part of a policy toward a solution rather than a "palliative." However, the author never in fact supports his arguments that the "empty" lands can in fact *now* support large populations. Rather he usually presents statements, and these statements do no more than contradict statements to the contrary. The author may also confuse the capacity of a country to absorb migrants *physically* and its *economic* capacity to absorb migrants.

The author cites the Japanese experience with industrialization and population growth to support his argument that population growth absorbed the gains of economic development and led to war. Lockwood's recent thorough study of Japanese economic development from 1870-1937 does not support this argument. Rather Lockwood shows that, while population growth probably did *not* on balance assist Japan's economic development, nevertheless Japan's economic development in all sectors of the economy and its entrance into the world market did lead to a steady growth in per capita income. Only

when Japan sought to become self-sufficient did the leaders find that its internal resources were insufficient to support the population at higher income levels, to develop an Empire, and to support a great war machine. Furthermore, even with open land areas in Hokkaido within Japan proper and with an Empire, the Japanese never did migrate to those regions in large numbers.

The discussion of India and China appears to be of more value, not only because it brings together data unavailable elsewhere, but because it provides insights into the problems of those two countries and the difficulties of solution.

The author's policy proposals are of some interest. The suggestions for an International Migration Authority and for a survey of the "open" areas of the world are worth while both for determining certain facts concerning "open" areas, and as a basis for carrying out migration. The discussion of internal population policy and of planned population maxima within countries is provocative, but the reviewer feels that these policies approach oversimplification in dealing with a very complex problem. One wishes also that the criticisms of colonialism added something to the subject, without essentially flogging a "dead" horse.

The reviewer may appear too critical. He is sympathetic to the author's position, and realizes that the author is primarily interested in arousing concern, stimulating discussion, and presenting policy solutions for a very serious problem. The book succeeds partially in these aims. However, by its weak argumentation, both logically and factually, it may discourage, rather than attract, many potential supporters of the author's purposes or policies.

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Population. By Ian Bowen. (Cambridge: Cambridge University Press. 1954. Pp. xv, 256. 10 *s.*, 6*d.*)

This short volume is the latest addition to the Cambridge Economic Handbooks. (It replaces Harold Wright's book by the same title, published in 1923.) Like the others in the series it is intended for the "ordinary reader and uninitiated student"—a fact that may be of importance in assessing the value of this particular volume.

The book is divided into three parts. The first contains a brief sketch of the world's and Britain's demographic experience. The bulk of the book, Part II, is devoted to matters of theory. There is a very long chapter on Malthusian theory, and shorter discussions on optimum population theory, population growth and the demand and supply of labor, economic expansion and population growth, and international migration. In the final section we find a discussion of the future prospects of British and world population, and their connection to economic and social well being.

Much of this volume is in the nature of a running argument of one sort or another rather than straightforward exposition of facts and theories. Professor Bowen appears to have definite convictions on a number of questions, and these in large part appear to determine the nature of this work. On the

whole the book is provocative rather than balanced, discursive and general rather than technical, and often appears to be chatty rather than systematic. A great deal of space is devoted to what might be called "What Malthus Really Meant and Why He Was Wrong." Bowen is not especially tolerant of the more charitable interpretations of the Malthusian position, and an explicit anti-Malthusian tone is evident throughout. He appears to believe that there is not very much danger of overpopulation anywhere, since ". . . diminishing returns are not a bogey that ought to frighten anyone capable of discerning the immense ranges of output in all industries, including agriculture, where increasing returns are possible" (p. 150). There are frequent passing references to social scientists and other scholars of varying degrees of fame, but it is to be doubted that the ordinary reader or uninitiated student would have heard of more than a very small proportion of them, at best.

There are many things that demographers talk about that will not be found here. For example, there is no systematic discussion of the various measures and indices of population growth developed by demographers, nor will the reader learn very much about the methods of population forecasting that have been employed in the past. Similarly, the usual discussions of the factors often considered as significant in determining the changing patterns of mortality and fertility are either absent or, when considered, treated only *en passant*, and rather discoursively.

In sum, we might say that this short and highly readable volume will introduce the reader to "the population debate," but many teachers may want their students to get somewhat more of the other side than is likely to be found in this particular handbook.

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Medical Care for Tomorrow. By MICHAEL M. DAVIS. (New York: Harper & Brothers. 1955. Pp. xii, 497. $6.50.)

This book is a gold mine for the field of medical care.

Michael Davis has been professionally concerned with medical economic affairs for more than forty years. He has been at various times an administrator, a director of research, and a reformer. For the last dozen years he has led the fight for compulsory national health insurance. Davis has drawn upon his fund of knowledge to produce the first approximation of an integrated picture of all the variables inherent in our national institutional structure for the distribution of medical care. To do this he has drawn upon the disciplines of philosophy, political science, history, economics, and the medical sciences themselves. An integrative task such as this involves recognizing the limits of the usefulness of each single approach to the subject. It is the sort of task that, though often attempted by committees, is finally possible only within single minds. Here the task is done by a man who has been applying his mind to the problems for a working lifetime.

Many persons may disagree with Davis in special cases. Most persons who

read his book, wherever they disagree, will pay him the immense compliment of accepting his basic assumptions regarding the dynamics of medical care in our society.

The first part of the book deals with the basic facts, and suggests useful working ideas. Economists will wish to criticize Davis' use of the term "demand"; he fails properly to relate the term to purchasing power. But his suggested term "social capital," applied to the public's investment in hospitals and similar facilities, is worthy of much wider application, and suggests exciting analytical possibilities. Davis points out elemental facts that, I am ashamed to say, never occurred to me. One is that though medical charges are incurred by individuals, bills tend to be met by families; this adds to the burden of larger families, and throws doubt on the usefulness of some statistical presentations. There is a useful interplay between description and analysis in this section; he does not attempt to present a great compendium of facts; he lets the argument have precedence, and adds what facts are relevant. A great contribution is Davis' constant emphasis upon the dimensions of the unknown in the field of medical care. We know little, for instance, of how to measure the quality of medical care. Here as throughout the book, Davis refers to any significant contributions which have been made, but also makes clear his own opinion in the matter.

The second part deals with the role of organization in the distribution of medical care, and includes much historical material on the genesis of the organizational pattern of the present. Davis succeeds in convincing the reader that there is nothing particularly sacred about the present situation.

The third part is devoted to health insurance, an institution close to the author's heart. The treatment of the growth and coverage of existing plans is very full indeed. The author writes, "A major consideration is that neither 'catastrophic insurance,' nor indemnity policies, nor insurance of the Blue Shield type offers opportunity for the preventive services . . . which lessen the likelihood of high-cost illnesses themselves" (pp. 225-26). Later he writes, ". . . health insurance is a financial mechanism for a medical end. The mechanism must serve the end and not be an end in itself. Those who elevate precepts of private insurance into immutable principles confuse the end with the mechanism" (p. 262).

The fourth part is a discussion of what Davis thinks should be done to improve medical care in the United States. This part also is interesting factually as well as conceptually. Davis states the case for compulsory national health insurance forcefully, but quite in its logical place within the volume as a whole. This chapter in no way colors the total work; and the book would have been incomplete without it.

I predict that this volume will go through many revisions, but that it will never be replaced. The field of medical care now has too many and too technical special aspects for any newcomer to achieve a mastery of the whole with justice to the parts. Every expert in a part of the field will have reason to dispute Davis; I challenge anyone to offer a substitute for his underlying logical structure.

The book has a useful selected bibliography listing fugitive and out-of-print materials as well as the standard works. The style is readable, if a bit discursive. Through all of the text the personality of the author is apparent—a reformer of the Old School, interested in "expedited gradualism," who concludes by saying "The evils of today should by no means be tolerated because they were worse yesterday" (p. 434).

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BECKWITH, B. P. *Marginal-cost price-output control—a critical history and restatement of the theory.* (New York: Columbia Univ. Press. 1955. Pp. viii, 283. $5.75.)

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With regard to the new edition, the author says in the preface: "Macroeconomics now takes a firmly equal place with microeconomics. There is more attention to problems of dynamics and growth. Marginal analysis has been moved in the direction of greater generality."

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NOTES

Erratum: The name of the nominee for president of the American Economic Association published in this section of the June 1955 number of the *Review* erroneously appeared as Edwin E. White. The nominee for the office of president in 1956 is Professor Edwin E. Witte, of the University of Wisconsin.

SIXTY-EIGHTH ANNUAL MEETING OF THE AMERICAN ECONOMIC ASSOCIATION

Hotel Commodore, New York City, December 28-30, 1955

Preliminary Announcement of the Program

Nearly half of the sessions of the program for this year are centered upon the economic growth of the United States, that is, on the problem of keeping the United States economy moving onward and upward. This means that both the secular and the periodic phases of the problem will be explored. Nine of the remaining sessions, including four that are joint with other associations, are primarily international or foreign in their scope and incidence. Since this is the year when the Association meets jointly with other social science associations, twelve sessions will be held jointly with other associations, in addition to the two joint luncheon meetings. The papers and discussions of eighteen sessions will be published in the Proceedings.

Wednesday, December 28, 1955

10:00 A.M. Meeting of the Executive Committee

12:30 P.M. Luncheon Meeting of the Executive Committee

12:30 P.M. Luncheon Meeting (Joint with the American Statistical Association)
THE ECONOMIC OUTLOOK
Speakers: EDWIN G. NOURSE, Joint Council on Economic Education
ALAN H. TEMPLE, National City Bank of New York

2:30 P.M. Economic Growth. I. STATEMENT OF THE PROBLEM OF KEEPING THE UNITED STATES ECONOMY MOVING FORWARD, BUT STEADILY
Chairman: CALVIN B. HOOVER, Duke University
Papers: Scope and Objectives of Ten Sessions on Economic Growth
THE CHAIRMAN
The Economic History of the United States in These Terms from 1870 to 1955, but Particularly since 1900
MOSES ABRAMOVITZ, National Bureau of Economic Research and Stanford University
The Goals of Economic Growth in the United States—Economic and Other Social Priorities
PAUL T. HOMAN, University of California at Los Angeles
Discussion: WILLIAM J. FELLNER, Yale University
FREDERICK V. WAUGH and JAMES P. CAVIN, U. S. Department of Agriculture

THE ECONOMIC POTENTIALS OF LATIN AMERICA
Chairman: THEODORE W. SCHULTZ, University of Chicago
Papers: Developments Under Way, Obstacles and Problems, and Potentials
SUNE CARLSON, United Nations
Some Policy Lessons for Economic Development in this Part of the World
THEODORE W. SCHULTZ, University of Chicago

Discussion: GEORGE GARVY, Federal Reserve Bank of New York
EMILIO G. COLLADO, Standard Oil of New Jersey
SIMON ROTTENBERG, University of Chicago

THE CHANGING PATTERNS OF COMPETITION IN TRANSPORTATION AND OTHER PUBLIC UTILITY LINES
Chairman: EDWARD W. MOREHOUSE, General Public Utilities Corporation
Papers: The Competition of Long-Distance Motor Trucking—Farm and Industrial Products and Supplies
CHARLES A. TAFF, University of Maryland
The Partnership Policy in Regional Power Planning
WALTON SEYMOUR, Washington, D.C.
Federal Regulation of Natural Gas Producers and Gatherers
MARTIN L. LINDAHL, Dartmouth College
Discussion: FRED V. STONE, Canadian Pacific Railway

THE THEORY OF GOVERNMENT EXPENDITURES (Joint with the Econometric Society)
Chairman: OSWALD BROWNLEE, University of Minnesota
Papers: Aspects of the Abstract Theory of Public Expenditures
PAUL A. SAMUELSON, Massachusetts Institute of Technology
A Multiple Theory of the Budget
RICHARD A. MUSGRAVE, University of Michigan
Discussion: WALTER S. SALANT, Brookings Institution
JULIUS MARGOLIS, University of California

8:30 P.M. Economic Growth. II. THE PRODUCTION AND CONSUMPTION ECONOMICS OF ECONOMIC GROWTH
Chairman: WILLARD L. THORP, Amherst College
Papers: The Production Economics of Economic Growth
W. DUANE EVANS, Bureau of Labor Statistics
The Consumption Economics of Economic Growth
RUTH P. MACK, National Bureau of Economic Research
The Value and Pricing Aspects
ARYNESS JOY WICKENS, Bureau of Labor Statistics
Discussion: EARL O. HEADY, Iowa State College
ROBERT FERBER, University of Illinois

CURRENT ECONOMIC THOUGHT AND ITS APPLICATION AND METHODOLOGY IN CONTINENTAL EUROPE
Chairman: ALEXANDER GERSCHENKRON, Harvard University
Papers: The Scandinavian Countries
HANS BREMS, University of Illinois
Holland
HANS THEIL, University of Chicago
Italy
FRANCISCO MODIGLIANI, Carnegie Institute of Technology
Eastern Europe Outside of Russia
Question Period Led by the Chairman

ARE UNION PRACTICES MONOPOLISTIC? (Joint with the Industrial Relations Research Association)
Chairman: RICHARD A. LESTER, Princeton University
Paper: To be announced
EDWARD S. MASON, Harvard University

Panel: Peter O. Steiner, University of California
Jules Backman, New York University
Peter Henle, American Federation of Labor
Charles C. Killingsworth, Michigan State College
Minear Sargent, Caterpillar Tractor Company

Tariff Policy for the U.S.A., A Strong Rich Country (Joint with American Farm Economic Association)
Chairman: An Introductory Statement. Charles P. Kindleberger, Massachusetts Institute of Technology
Panel: Don D. Humphrey, Duke University
Lawrence W. Witt, Michigan State College
Richard M. Bissell, Washington, D.C.
Dennis W. Fitzgerald
Donald B. Marsh, McGill University
Summary Statement by the Chairman

Thursday, December 29

9:30 A.M. Economic Growth. III. Income Distribution Aspects of Expanding Production and Consumption
Chairman: Paul Samuelson, Massachusetts Institute of Technology
Papers: Distribution of Aggregate Income between Taxes and Other than Taxes, and among Consumption, Savings, and Capital Formation
Distribution of Incomes of Business Firms among Taxes, Dividends, and Retained Earnings
John Lintner, Harvard University
Discussion: Lloyd Ulman, University of Minnesota
Lorie Tarshis, Stanford University

Economic Growth. IV. The Shortening Work Week as a Component of Economic Growth (Joint with the Industrial Relations Research Association)
Chairman: Gerhard Colm, National Planning Association
Paper: The Alternatives
Charles Stewart, United States Department of Labor
Panel: Clark Kerr, University of California
Solomon Barkin, Textile Workers Union of America
Nelson N. Foote, University of Chicago
Forest F. Hill, Cornell University
Lester Kellogg, Deere and Company

Report of the Attorney-General's Committee on Anti-Trust Policy
Chairman: Corwin D. Edwards, University of Chicago
Papers: Market Power and Business Conduct: Some Comments on Anti-Trust Policy
Edward S. Mason, Harvard University
Enforceable Competition: Unruly Reason or Reasonable Rules
Kingman Brewster, Harvard University
Competition: Hard or Soft
Clair Wilcox, Swarthmore College
Discussion: George W. Stocking, Vanderbilt University
Alfred E. Kahn, Cornell University
Clare E. Griffin, University of Michigan
George J. Stigler, Columbia University

Economic Growth. X. URBAN GROWTH AND DEVELOPMENT (Joint with Regional Scientists)
Chairman: WALTER ISARD, Massachusetts Institute of Technology
Papers: The Spread of Cities
DONALD J. BOGUE, University of Chicago
Changes Within Cities
CHESTER RAPKIN, Columbia University
Discussion: RICHARD U. RATCLIFF, University of Wisconsin
MARTIN MYERSON, University of Pennsylvania
JOSEPH L. FISHER, Resources for the Future, Inc.

THE DYNAMICS OF FOOD RETAILING (Joint with the American Marketing Association and the American Farm Economic Association)
Chairman: JOSEPH ACKERMAN, Farm Foundation
Papers: Movements in the Retail Distribution of Food in the United States
ROBERT W. MUELLER, Editor, *The Progressive Grocer*
Some Recent Developments in Food Retailing in Europe
HERBERT EKLOEH, Germany
Supplementary Statements: WILLIAM APPELBAUM,
RICHARD H. HOLTON, Harvard University

2:30 P.M. Economic Growth. V. THE INCREASE-OF-CONSUMPTION PART OF ECONOMIC GROWTH
Chairman: ASHER ISAACS, University of Pittsburgh
Papers: Price and Income Elasticity of Demand as Determinants of the Increase-of-Consumption Part of Economic Growth
ELIZABETH GILBOY, Harvard University
The Potentials of the Shifting of Price- and Income-Elasticity Demand Curves in Order to Keep the Economy Moving Forward
JAMES DUESENBERRY, Harvard University
Brief Reports on Current Research Projects in Consumption and Demand
JOHN B. LANSING, University of Michigan
IRWIN FRIEND, University of Pennsylvania
JAMES TOBIN, Yale University
ROBERT SCHLAIFER, Harvard University

Economic Growth. VI. GOVERNMENT EXPENDITURES AND ECONOMIC GROWTH
Chairman: ROY BLOUGH, Columbia University
Papers: Government Expenditures and the Long-Run Goals of Economic Growth
C. LOWELL HARRISS, Columbia University
Government Expenditures and the Short-Run Goal of Steady Growth
DAN T. SMITH, Harvard University
Discussion: WALTER FROELICH, Marquette University
JOHN F. DUE, University of Illinois
MARION CLAWSON, Resources for the Future, Inc.

THE POPULATION SPECTRE—RAPIDLY DECLINING DEATH RATES IN DENSELY POPULATED COUNTRIES (Joint with the American Farm Economic Association)
Chairman: MERRILL K. BENNETT, Food Research Institute, Stanford University
Papers: A Statement of the Situation
KINGSLEY DAVIS, University of California
Food and Agricultural Possibilities
CHARLES E. KELLOGG, United States Department of Agriculture
Nonagricultural Possibilities
REUBEN E. SLESINGER, University of Pittsburgh

Possible and Probable Outcomes, and Courses of Action to be Considered
JOSEPH J. SPENGLER, Duke University
Question Period Led by the Chairman

FEDERAL RESERVE BOARD COMMITTEE REPORTS: I. SAVING STATISTICS AND CONSUMER EXPECTATIONS
Chairman: RALPH A. YOUNG, Federal Reserve Board
Papers: RAYMOND GOLDSMITH, National Bureau of Economic Research
JAMES TOBIN, Yale University
Discussion: GEORGE KATONA, University of Michigan
MORRIS COHEN, National Industrial Conference Board

8:30 P.M. *Chairman:* THOMAS NIXON CARVER, Santa Monica, California
PRESIDENTIAL ADDRESS: Agriculture in the Economy of the Nation
JOHN D. BLACK, Harvard University

Friday, December 30

9:30 A.M. Economic Growth. VII. THE MONETARY ROLE IN BALANCED ECONOMIC GROWTH
Chairman: MILTON FRIEDMAN, University of Chicago
Paper: CHARLES R. WHITTLESEY, University of Pennsylvania
Panel: IRA O. SCOTT, University of Minnesota
PAUL W. MCCRACKEN, University of Michigan
HOWARD S. ELLIS, University of California
EDWARD S. SHAW, Stanford University

Economic Growth. VIII. HIGHWAY DEVELOPMENT AND FINANCING (Joint with the American Finance Association)
Chairman: WALTER W. HELLER, University of Minnesota
Paper: Highway Development and Financing as a Case Study in the Problem
THE CHAIRMAN and OSWALD H. BROWNLEE, University of Minnesota
Panel: HAROLD M. GROVES, University of Wisconsin
JAMES C. NELSON, Washington State College
ARNOLD M. SOLOWAY, Harvard University
WILLIAM D. ROSS, Louisiana State University
HAROLD W. TORGERSON, Northwestern University

ECONOMICS IN THE CURRICULA OF SCHOOLS OF BUSINESS
Chairman: RAYMOND T. BOWMAN, University of Pennsylvania
Papers: Over-all Statement of the Problem and Situation
NEIL H. JACOBY, University of California at Los Angeles
By Universities: GEORGE LEE BACH, Carnegie Institute of Technology
EDWARD H. LITCHFIELD, Cornell University
DONALD W. O'CONNOR, Columbia University
ARTHUR M. WEIMER, University of Indiana
EWALD T. GRETHER, University of California at Berkeley

THE LAND TENURE SITUATION AROUND THE WORLD (Joint with the American Farm Economic Association)
Chairman: JOSEPH ACKERMAN, Farm Foundation
Introductory Paper: KENNETH H. PARSONS, University of Wisconsin
Papers by Individual Countries:
India and Pakistan
LEE R. MARTIN, North Carolina State College
Spain and Southwest Europe
JOSÉ VERGARA, Spanish Embassy

Australia
THOMAS H. STRONG, Bureau of Agricultural Economics, Australia
Mexico
EDMUNDO FLORES, *Nacional Financiera,* Mexico City
Japan
WOLF LADEJINSKY, Department of State
Question Period Led by the Chairman

FEDERAL RESERVE BOARD COMMITTEE REPORTS: II. INVENTORY STATISTICS, INVESTMENT EXPECTATIONS, AND GENERAL BUSINESS EXPECTATIONS
Chairman: MARTIN GAINSBRUGH, National Industrial Conference Board
Papers: GEORGE W. TERBORGH, Machinery & Allied Products Institute
J. FREDERICK DEWHURST, Twentieth Century Fund
Discussion:

12:30 P.M. Luncheon Meeting (Joint with the American Finance Association)
REFLECTIONS OF A CENTRAL BANKER
Speaker: ALLAN SPROUL, President, Federal Reserve Bank of New York

2:30 P.M. Economic Growth. IX. UNEMPLOYMENT AS A PHASE OF ECONOMIC GROWTH
Chairman: EDWIN G. NOURSE, Joint Council on Economic Education
Paper: The Structure of Unemployment in the United States
ISADOR LUBIN, Industrial Commissioner, State of New York
Discussion: EWAN CLAGUE, United States Department of Labor
LAZAR TEPER, International Ladies Garment Workers Union
Paper: Measures to be Taken at Different Levels and Distributions of Unemployment
ALBERT G. HART, Columbia University
Discussion: ALBERT S. EPSTEIN, International Association of Machinists
Question Period

ECONOMIC THOUGHT AND ITS APPLICATION AND METHODOLOGY IN THE EAST
Chairman:
Papers: India
MAX F. MILLIKAN, Massachusetts Institute of Technology
Pakistan
OVERTON H. TAYLOR, Harvard University
Japan
MARTIN BRONFENBRENNER, University of Wisconsin
The Middle East
DON PATINKIN, The Hebrew University, Israel
Question Period Led by the Chairman

THE ECONOMIC POTENTIALS OF AFRICA
Chairman: JOHN W. GARDNER, Carnegie Corporation of New York
Papers: Economic Development, The African Scene
WILLIAM A. HANCE, Columbia University
Anthropological Factors in the Economic Evolution of Africa
MELVILLE J. HERSKOVITZ, Northwestern University
Discussion: LLOYD G. REYNOLDS, Yale University
CALVIN W. STILLMAN, University of Chicago
SANFORD A. MOSK, University of California

MINIMUM WAGES AND OTHER LABOR STANDARDS CONSIDERED IN RELATION TO ECONOMIC GROWTH IN UNDERDEVELOPED COUNTRIES (Joint with the American Farm Economic Association)

Chairman: KARL BRANDT, Food Research Institute, Stanford University
Papers: In Factory Employment
ELMO P. HOHMAN, Northwestern University
In Small-scale and Cottage Industry
JEANNE S. MINTZ, New York City
In Agriculture
LOUIS J. DUCOFF, United States Department of Agriculture
Supplementary Statements: EGBERT DEVRIES, International Bank for Reconstruction and Development
JOHN WINDMULLER, Cornell University
J. HENRY RICHARDSON, University of California.

5:00 P.M. Business Meeting
6:00 P.M. Dinner Meeting of the Executive Committee

THE FIRST CONGRESS OF THE INTERNATIONAL ECONOMIC ASSOCIATION, ROME, ITALY, SEPTEMBER 6-11, 1956

The International Economic Association came into existence in 1950, through the efforts of a group of European and American economists convened by UNESCO. In constitution it represents a federation of the various national associations in the field of economics, including the American Economic Association. Its Council is nominated by the national associations, and four representatives of the American Economic Association serve on it. The officers of the International Economic Association for the current year are as follows: *Honorary Presidents:* J. M. Clark, Luigi Einaudi, Gottfried Haberler, A. C. Pigou, and Arthur Spiethoff; *Executive Committee:* Howard S. Ellis (President), Leon Dupriez (Vice-President), Austin Robinson (Treasurer), Walter Hoffmann, Emile James, Erik Lindahl, Volrico Travaglini, C. N. Vakil, Xenophon Zolotas; *Secretary:* Helene Berger-Lieser, Paris VIII, 7, Rue de Miromesnil.

A main feature of the work of the International Economic Association has been a series of small conferences of persons making noteworthy contributions to certain defined fields of economics. The first conference was concerned with the problems of long-term international balance; the second with methods of teaching economics; the third with the regulation of monopoly; the fourth with the business-cycle in the postwar world; the fifth with the determinants of economic progress; the sixth with wage determination; the seventh—being held in September, 1955—is concerned with problems of migration. The working papers and discussions of these conferences have been or are to be publishd.

These small conferences have been of very great value in bringing together workers in the same fields, many of whom had never previously met each other, and in clearing up ambiguities and misunderstandings. But they have inevitably been confined to small numbers of selected experts, and it has not been practical to invite many who would have enjoyed opportunities to meet and discuss.

The purpose of the Rome Congress is to provide a wider opportunity for any members of the twenty-three associations that compose the International Economic Association to take part in the work of the Association. All members of the American Economic Association are entitled to take part in the Congress. The program follows:

Thursday, September 6. Opening of the Congress. Stability and Progress: The Richer Countries' Problem, by Sir Dennis Robertson.

Friday, September 7. Stability and Progress: The Poorer Countries' Problem, by Jacob Viner.

Saturday, September 8. The Quest for Stability: The Real Factors, by François Perroux.

Monday, September 10. The Quest for Stability: The Monetary Factors, by Gottfried Haberler.

Tuesday, September 11. International Stability and the National Economy, by Erik Lundberg.

A fee of $5.00 will entitle participants to receive all Congress papers, which will be available in Rome and not distributed in advance. Meetings will take place in the Faculty of Law of the University of Rome, facilities of which will be available to the IEA by

courtesy of Professor G. Ugo Papi, Rector of the University of Rome. Each day's sessions will open with an address, the text of which will be available to Congress participants in the two official languages, French and English. The subsequent discussion of the address will, in each case, be introduced by two speakers chosen in advance. The discussion will be interpreted into the two official languages.

On behalf of the IEA, the Italian Tourist Agency CIT will take care of registration and the collection of the conference fee, as well as travel arrangements and hotel reservations. Those wishing to participate should as soon as possible write to CIT (Congress Department), Piazza Colonna 193, Rome, Italy. They will receive an application form, together with details of reduced fares and of hotel accommodation available in Rome.

International Committee for Social Sciences Documentation

This Committee was created at the end of 1950 as a result of meetings of experts convened by UNESCO. The purposes of the Committee are the coordination and improvement of existing bibliographic instruments for the social sciences, and the creation of new bibliographic instruments in this area. It is the intention to establish periodical comprehensive bibliographies for each major discipline; and to publish periodicals containing abstracts and specialized bibliographic essays, at least for certain disciplines.

Annual international bibliographies have been undertaken for sociology (Volume I, covering the year 1951, appeared in 1952), for political science (Volume I, for 1952, appeared in 1954), and for economics (Volume I, covering 1952, appeared early in 1955). *International Political Science Abstracts,* a quarterly journal of abstracts of articles in the field of political science, has appeared regularly since 1951. Since 1952, bibliographic reports on important research trends in sociology have been published twice a year in *Current Sociology.* The Committee has prepared an *International Repertory of Social Science Documentation Centers* and *A Selected Inventory of Periodical Publications* (the latter was published by UNESCO in 1951, and the first supplement appeared in 1953); it has edited a *World List of Social Sciences Periodicals* which was published by UNESCO in 1954; and, on an experimental basis, it prepared in 1954 some cumulative lists of works used in the teaching of the social sciences in the universities of the United Kingdom and of Sweden.

The address of the Committee is: Comité International pour la Documentation des Sciences Sociales, 27 rue Saint-Guillaume, Paris 7; and the secretary general is J. Meyriat.

Schumpeter Prize Fund

A fund has been gathered by friends of the late Joseph A. Schumpeter to establish a prize to be awarded periodically for original work in the field of economics. The Schumpeter Prize in the amount of not less than $1,000 will be awarded once every two years providing that sufficiently meritorious work has come to the attention of the awarding board. If sufficient income has accumulated and work of sufficient merit has been found, the awarding board may award prizes in one-year intervals.

Anyone who has made an original contribution to economics is qualified to obtain the prize—provided, however, that his contribution falls within those branches of economics in which the late Professor Joseph A. Schumpeter made his most creative contributions. For the present, the study of economic development, and its interrelations with historical, social, and political evolution, and the interrelations between economic theory, statistics, and history seem to be the most appropriate; but relevant theoretical work is to be included.

The primary test in awarding the prize is to be the depth and originality of perception. Whether the work is an article in a periodical or a full-length monograph is irrelevant.

The prize will be awarded by a board consisting of three members of the faculty of economics at Harvard University.

The first award of the newly created Schumpeter Memorial Prize has been made to Professor Ragnar Frisch, of the University of Oslo, Norway, in recognition of his numerous pathbreaking achievements in the fields of economic theory, statistics, and econometrics.

Recently elected officers of the Metropolitan Economic Association, New York City, are: president, Nilan Norris, Hunter College; vice-president, C. Lowell Harriss, Columbia University; secretary, Miriam Civic, National Industrial Conference Board; treasurer, Mildred Rendl, General Electric Company.

Deaths

Helen Baker, associate director, Industrial Relations Section, Princeton University, died January 10, 1955.

Walter E. Clark, president of the University of Nevada from 1917 to 1938, died May, 1955.

Bernard H. Hartzell, of Youngstown, Ohio, died January 9, 1955.

Archibald J. Nichol, associate professor of economics in the Wharton School of Finance and Commerce, University of Pennsylvania, died April 18, 1955.

Daniel T. Selko died at Caernarvonshire, Wales, February 27, 1955.

Appointments and Registrations

John F. Adams has been promoted to professor of economics in the School of Business and Public Administration, Temple University.

Quincy Adams has been transferred from the Central Intelligence Agency to an economist post with the Federal Trade Commission.

John S. Almeida has been appointed instructor in the College of Business Administration, University of Florida.

William H. Andrews, Jr., has been promoted from assistant professor to associate professor at Indiana University.

Ellis Austin, of Michigan State University, has been appointed assistant professor of economics at the University of Pittsburgh.

George Babilot, Carnegie fellow, has been appointed instructor in economics at the University of Oregon.

L. Durward Badgley has been promoted to the position of director of real estate and mortgage research in the Mutual Life Insurance Company of New York.

Stephen J. Barres has been appointed instructor in economics at Texas Western College, University of Texas.

David W. Belcher has been promoted from associate professor to professor in the School of Commerce, University of Wisconsin.

Philip W. Bell, of Haverford College, has been appointed acting director of the International Finance Section, Princeton University. He will serve half-time at Princeton and half-time at Haverford.

Michael H. Belshaw has been appointed lecturer in economics at Barnard College for the current academic year.

Jack F. Bennett has resigned as monetary affairs advisor in the Foreign Operations Administration to take a position in the Treasurer's department of the Standard Oil Company of New Jersey in New York.

Floyd A. Bond has been selected to receive the Trustees' Distinguished Professorship Award for distinguished service, Pomona College.

Chelcie C. Bosland has been granted a year's leave of absence from Brown University to serve as visiting professor of economics at Northwestern University.

Thomas R. Bossort, Jr., has been promoted from assistant professor to associate professor of management in the School of Business, Indiana University.

Elbert V. Bowden, formerly research associate in the University of Kentucky Bureau of Business Research, has been appointed instructor in the department of economics and business administration of Duke University.

Charles T. Bowen has been appointed superintendent of the Consolidated Community School District No. 3, Literberry, Illinois.

Howard R. Bowen, of Williams College, became president of Grinnell College as of July 1, 1955.

Raymond T. Bowman has been granted leave from the Wharton School of the University of Pennsylvania to serve as assistant director of the Bureau of the Budget.

S. E. Braden has been promoted from associate professor to professor of economics at Indiana University. He is also associate dean of the College of Arts and Sciences.

Robert E. Branson, formerly of the Agricultural Marketing Service of the Department of Agriculture, has been appointed associate professor of agricultural economics at Texas A & M College.

Elmer C. Bratt was awarded an honorary degree of doctor of laws at the June 1955 commencement of the University of Nebraska. He is spending the year 1955-56 in Ceylon on a Fulbright grant, making an evaluation of Ceylon's rural development program.

Andrew F. Brimmer, of Harvard University, has joined the research department of the Federal Reserve Bank of New York.

George H. Brown has resigned as professor of marketing in the School of Business, University of Chicago, to become manager of consumer research, Ford Division, Ford Motor Company.

D. H. Buchanan, professor of economics, emeritus, has returned to teaching duties at the University of North Carolina for the fall semester.

Norman S. Buchanan, has resigned from the University of California to accept a position as director of the Division of Social Sciences of the Rockefeller Foundation.

Albert Buckberg has been appointed instructor in economics at the University of Michigan.

Orin E. Burley has been appointed chairman of the department of marketing and foreign commerce in the Wharton School, University of Pennsylvania.

Clarence N. Callender has retired from teaching in the Wharton School, University of Pennsylvania, where he had served as professor of business law.

William J. Carson has been granted a leave of absence from the Wharton School, University of Pennsylvania, to serve as director of the National Bureau of Economic Research.

Philip W. Cartwright is acting executive officer of the economics department of the University of Washington for the current academic year.

Hollis B. Chenery has been promoted to associate professor of economics at Stanford University.

Sherrill Cleland, of Princeton University, has accepted an appointment as assistant professor of economics at the University cf Richmond.

Denzel C. Cline has served as acting head of the department of economics, Michigan State University, during the leave of Charles C. Killingsworth.

John R. Coleman, of the Massachusetts Institute of Technology, has been appointed associate professor of economics at Carnegie Institute of Technology.

Alfred H. Conrad, of Harvard University, has been appointed assistant professor of economics at Northwestern University.

John H. Cover is working on an Asian area study in the Bureau of International Relations of the University of California during the current academic year.

Harold G. Cutright has been appointed professor in the department of marketing, University of Pittsburgh.

Sherman Dallas has been appointed assistant professor, Indiana State Teachers College, Terre Haute.

Lance E. Davis has been appointed instructor in economics at Purdue University.

Karl de Schweinitz has been promoted to associate professor of economics at Northwestern University.

Frank T. de Vyver is retiring from Erwin Mills and is returning to full-time teaching in the department of economics and business administration at Duke University.

Daniel Diamond has been appointed instructor in economics in the School of Commerce, Accounts and Finance, New York University.

D. Lyle Dieterle has been appointed chairman of the accounting department, School of Business, Indiana University, succeeding A. L. Prickett.

William P. Dillingham, of Florida State University, served as a consultant to the Presidential Commission on Veterans Affairs during the summer of 1955.

Evsey D. Domar has been promoted to professor of political economy at the Johns Hopkins University.

Robert Dorfman has resigned from the University of California to take a post as associate professor of economics at Harvard University.

H. M. Douty, chief of the Division of Wages and Industrial Relations, Bureau of Labor Statistics, has received a Rockefeller Public Service Award. He is spending this year abroad, principally at the London School of Economics, engaged in research into problems of wage determination and employment.

C. L. Dunn has been promoted to associate professor of accounting at Louisiana State University.

John S. Dydo, of the University of California, has been appointed instructor in economics at Vassar College for the current year.

Richard A. Easterlin is on leave from the Wharton School, University of Pennsylvania, to serve as research associate at the National Bureau of Economic Research.

Nylen W. Edwards has been appointed assistant professor of transportation at the University of Missouri.

Harry Ernst has been appointed assistant professor of economics at Tufts University.

Alexander Firfer is economic consultant to the Administración de Fomento Económico of Puerto Rico on problems of industrial economics, small business and public utilities.

William A. Frank has accepted a position in the office of the executive vice president and general manager, Sperry Gyroscope Company, Great Neck, N.Y.

Charles Gilbert has been promoted from instructor to assistant professor of economics in the School of Commerce, Accounts, and Finance, New York University.

Marion H. Gillim has been appointed executive officer of the department of economics, Barnard College.

William E. Gordon has accepted an appointment as instructor in economics at Marquette University.

Amor Gosfield has been appointed lecturer in the economics department, University of Pittsburgh.

Frank M. Graner has been promoted from associate professor to professor in the School of Commerce, University of Wisconsin.

David Green has been promoted to assistant professor of business administration in the School of Business, University of Chicago.

Geza B. Grosschmid has been promoted from associate professor to professor of economics at Duquesne University.

Morton C. Grossman has been promoted to associate professor of economics at the State College of Washington.

Joseph R. Guerin has been appointed instructor in economics in the Wharton School, University of Pennsylvania.

F. J. Guerra has resigned from Louisiana State University to accept a position in the School of Commerce, St. Louis University.

Harold W. Guthrie has been promoted to assistant professor of economics at Yale University.

Paul N. Guthrie has assumed the chairmanship of the department of economics at the University of North Carolina.

Wayne W. Guthrie has been appointed assistant professor of marketing at the University of Idaho.

James K. Hall was on leave from the University of Washington in the spring term to serve on an assignment with the Foreign Operations Administration in Vietnam as economic consultant on tax and budget problems.

J. Whitney Hanks has been promoted from associate professor to professor of economics at the University of Utah.

Louis T. Harms has been promoted to assistant professor in the School of Business and Public Administration, Temple University.

Seymour E. Harris has been appointed chairman of the department of economics, Harvard University. He will continue to serve as chairman of the New England Governors' Textile Committee and as adviser to the New England Governors with respect to the effect of federal economic policies upon the New England economy.

C. Lowell Harriss, of Columbia University, is serving as consultant to the City Administrator, New York City, studying problems of local business taxation.

Douglas Hartle has resigned as instructor in the department of economics and business administration at Duke University.

Milton S. Heath has been appointed chairman of graduate studies and research in the areas of economics and business administration at the University of North Carolina.

John Henderson has been appointed assistant professor in the economics department, University of Pittsburgh.

James B. Hendry has been appointed instructor in economics at Michigan State University.

Bert G. Hickman has resigned from Northwestern University to join the staff of the Brookings Institution.

R. J. Hildreth, formerly of Iowa State College, has been appointed assistant professor of agricultural economics at Texas A & M College.

George W. Hilton has been appointed instructor in economics at Stanford University.

J. E. Hipp has been appointed instructor in the College of Business Administration at the University of Florida.

Ralph C. Hoeber, of the University of Hawaii, has accepted a year appointment as lecturer in business law in the School of Business Administration, University of California, Los Angeles.

Charles T. Horngren has resigned from the School of Business, the University of Chicago, to become assistant professor of accounting at Marquette University.

Hendrik S. Houthakker has been appointed associate professor of economics at Stanford University.

William M. Howard has accepted an appointment as associate professor in the College of Business Administration at the University of Florida.

James E. Howell has been appointed instructor in economics at Yale University.

Richard Huber is on leave from the University of Washington to serve as Fulbright lecturer at Nagoya University in Japan.

Grover G. Huebner has retired from the Wharton School, University of Pennsylvania, where he had served as professor of commerce and transportation and as chairman of the marketing and foreign commerce department.

H. W. Huegy has been appointed head of the marketing department of the University of Illinois, succeeding P. D. Converse.

John M. Hunter, of Michigan State University, is in Saigon, Vietnam, as a specialist in international trade under a technical assistance contract between Michigan State and the Foreign Operations Administration.

Patrick Huntley has been appointed instructor in the department of economics and business administration of Duke University.

John Ise, who retired from the University of Kansas in June, is teaching at Goucher College in the current academic year.

John E. Jeuck has resigned as dean of the School of Business, University of Chicago, to become professor of business administration at Harvard Graduate School of Business Administration.

Harry G. Johnson, of Kings College, Cambridge, was visiting professor of economics at Stanford University in the summer quarter.

Howard Johnson has resigned from the University of Chicago to become associate professor of industrial management and director of the Executive Development Program in the School of Industrial Management, Massachusetts Institute of Technology.

Paul V. Johnson has been appointed instructor in economics at Western Reserve University.

Matthew H. Jonas has been appointed instructor in economics at the University of Texas.

C. Clyde Jones, formerly of the University of Georgia, has been appointed assistant professor of economics at the University of Illinois.

Robert M. Kamins has been promoted from associate professor to research professor in the economics department and to the directorship of the Legislative Reference Bureau at the University of Hawaii.

Samuel T. Keim has resigned from Texas A & M College to become chairman of the department of business administration at Kansas State College.

Eugene J. Kelley has been promoted from assistant professor to associate professor of economics at Clark University.

Charles C. Killingsworth has been designated coordinator of Michigan State University's technical assistance program for Vietnam under contract with the Foreign Operations Administration.

Wylie Kilpatrick has been granted six months' leave from the University of Florida to act as fiscal consultant to the Northern Virginia Regional Planning Commission in Arlington, Virginia.

Martin L. King has been appointed assistant professor of commerce at the University of Kentucky.

Peter S. King has resigned from the School of Business, Indiana University, to accept a position at the Massachusetts Institute of Technology.

Lawrence R. Klein has been appointed professor of economics, and continues as research associate in the Institute for Social Research, at the University of Michigan.

Paul L. Kleinsorge, of the University of Oregon, is doing research this year at Kobe University, Japan.

R. S. Kline, of the University of Georgia, has been appointed associate professor in the College of Business Administration, University of Florida.

W. Donald Knight, director of the Bureau of Business Research and Service in the School of Commerce at the University of Wisconsin, has been promoted to the rank of full professor.

Anthony Y. Koo has been promoted to associate professor of economics at Michigan State University.

William Korbel has resigned from the University of Kansas to join the marketing research division of Telechron Company.

Irving B. Kravis has been named chairman of the economics department of the Wharton School, University of Pennsylvania.

Clifton H. Kreps, Jr., has been appointed Wachovia associate professor of banking at the University of North Carolina.

C. Arthur Kulp has been named dean of the Wharton School, University of Pennsylvania.

Ernest Kurnow, now on leave serving the Foreign Operations Administration in Ankara, Turkey, has been promoted from associate professor to professor of economics in the School of Commerce, Accounts and Finance at New York University.

David T. Lapkin has been promoted to associate professor of economics at the State College of Washington.

Robert G. Layer has resigned from Texas A & M College to become acting chairman of the department of economics at Southern Illinois University.

Don E. Leatherman has been appointed faculty lecturer in management in the School of Business, Indiana University.

Wayne A. Leeman has been promoted to associate professor of economics at the University of Missouri.

Mark W. Leiserson has been promoted to assistant professor of economics at Yale University.

J. D. Leonard has resigned as instructor in economics at Purdue University.

Enrique Lerdau, of the University of Wisconsin, has been appointed instructor in economics at Carnegie Institute of Technology.

Eugene M. Lerner, of the University of Idaho, has been appointed a research associate with the National Bureau of Economic Research for the current year.

Harold L. Levinson has been promoted to associate professor of economics at the University of Michigan.

Richard W. Lindholm is in Saigon, Vietnam, as a specialist of public finance under a technical assistance contract between Michigan State University and the Foreign Operations Administration.

Justin G. Longenecker has joined the faculty of Baylor University as associate professor of management.

Kullervo Louhi has been promoted to associate professor of accounting in the School of Business of the University of Chicago.

Ronan G. MacDonald has been promoted to assistant professor of economics at Fordham University.

Maurice C. Mackey has been appointed assistant professor of economics at the University of Illinois.

C. Ward Macy, of the University of Oregon, was a Fulbright lecturer on contemporary economic policy at the Conference on American Studies, Oxford University, in the summer of 1955.

Everett J. Mann has resigned from the department of economics and business administration at Duke University.

Fritz Karl Mann, of American University, taught at the University of Cologne during the summer semester.

Jacob Marschak, of Yale University, is a fellow of the Ford Center for Advanced Study in the Behavioral Sciences, Stanford, California, during the current year.

Howard Marshall is on leave from Vassar College this year and is teaching at Wesleyan University.

Joseph L. Massie has been appointed assistant professor of business administration in the School of Business, University of Chicago.

Leonard G. Mathy has been promoted to professor of economics at Los Angeles State College.

Donald J. McClurg has been appointed instructor in economics at the University of Texas.

L. W. McKenzie, of Duke University, will spend the spring semester of 1956 at Yale as a guest of the Cowles Commission.

Taylor W. Meloan has been promoted from assistant professor to associate professor of marketing in the School of Business, Indiana University.

John R. Meyer has been appointed assistant professor of economics at Harvard University.

Robert R. Milroy has been promoted from associate professor to professor of accounting in the School of Business of Indiana University.

Robert Minton, recently research associate in the University of Kentucky Bureau of Business Research, has accepted a teaching position at Memphis State College.

R. V. Mitchell has been granted a semester's leave from the University of Illinois to do consulting work with the firm of Alderson & Sessions in Philadelphia.

Clarence A. Moore, formerly of the University of Chicago, has been appointed assistant professor of agricultural economics at Texas A & M College.

David G. Moore has been appointed associate professor of business administration and director of the Executive Program in the School of Business, University of Chicago.

Theodore Morgan has been promoted from associate professor to professor of economics at the University of Wisconsin. He is currently on leave to complete a research project on the economic development of Ceylon.

Irving A. Morrissett, of the Survey Research Center of the University of Michigan, has been appointed assistant professor of economics at Purdue University.

John F. Muth has been appointed instructor in economics at Carnegie Institute of Technology.

Richard Muth has been appointed lecturer in political economy at the Johns Hopkins University.

M. J. Nadworny has been promoted to associate professor in the department of commerce and economics at the University of Vermont.

William H. Nicholls served as technical director of the seventh American Assembly, Graduate School of Business, Columbia University, on "United States Agriculture: Perspective and Prospects," which met in May, 1955.

Elbert A. Nyquist has been promoted to assistant professor in the department of commerce and economics of the University of Vermont.

Clinton L. Oaks has resigned from the University of Utah to accept a position in the marketing department of the University of Washington.

Thomas J. Orsagh, formerly instructor in finance, has been appointed instructor in economics in the Wharton School, University of Pennsylvania.

Robert C. Ortner has been appointed instructor in statistics at the Wharton School, University of Pennsylvania.

J. M. Owen has been promoted to associate professor of accounting at Louisiana State University.

James W. Parsons, Jr., of Louisiana State University, has accepted an appointment as associate professor of accounting and statistics at Baylor University.

James Parthemos has been appointed instructor in the department of economics and business administration of Duke University.

Don Patinkin has been appointed visiting lecturer in the department of political economy at the Johns Hopkins University for the current academic year.

Robert T. Patterson has resigned from New York University to accept an appointment as associate professor of public finance at Claremont Men's College.

Merton J. Peck, of Harvard University, has been appointed assistant professor of economics at the University of Michigan.

Mark Perlman has been appointed assistant professor of political economy at the Johns Hopkins University.

William S. Peters, formerly of the Wharton School, University of Pennsylvania, has accepted a position in the School of Business Administration of the University of Montana.

Thomas A. Petit, of the University of California, Berkeley, has accepted an appointment as acting assistant professor of marketing in the School of Business Administration and assistant research economist in the Bureau of Business and Economic Research at the University of California, Los Angeles, for the year 1955-56.

Robert B. Pettengill has accepted a year appointment as visiting professor of economics at Oberlin College.

Giulio Pontecorvo has been appointed associate in economics for the year 1955-56 in the department of economics of the University of California, Berkeley.

Rudolph A. Postweiler has been appointed assistant professor of economics at the University of Idaho.

Hoyt Price has been assigned to the Bureau of Far Eastern Affairs, Department of State as international economist.

A. L. Prickett has resigned as chairman of the accounting department in the School of Business, Indiana University, but is continuing to serve as professor of accounting.

Malcolm L. Pye has been appointed assistant professor in the College of Business Administration of the University of Florida.

Leonard Rall, of Michigan State University, is serving as professor of economics in the School of Business at Sao Paulo, Brazil, under a technical assistance contract between the Foreign Operations Administration and Michigan State University.

J. W. Reddoch has been promoted to assistant professor of business administration and assistant to the dean, Louisiana State University.

Curtis Reierson, Jr., has been appointed assistant professor of marketing at Baylor University.

Stewart H. Rewoldt has been promoted from assistant professor to associate professor of marketing in the School of Business of Indiana University.

J. Henry Richardson, Burton Montague Professor of Industrial Relations at the University of Leeds, England, has been appointed visiting professor of economics at the University of California, Berkeley, for the current academic year.

L. Victor Riches has resigned from the University of Utah to accept a position with the Stanford Research Institute.

Lawrence S. Ritter is on leave from Michigan State University to conduct a research study for the Federal Reserve Bank of New York.

Frank G. Rizzardi has resigned from the General Motors Institute to accept an appointment as assistant professor of accounting at the University of Idaho

David R. Roberts, formerly of Carnegie Institute of Technology, has been appointed dean of the College of Business Administration of Butler University.

Harry V. Roberts has been promoted to associate professor of statistics in the School of Business of the University of Chicago.

W. Clyde Robinson has been appointed assistant professor of economics at Baylor University.

Charles E. Rollins has been appointed assistant professor of economics at Stanford University for the current year.

Nathan Rosenberg, of the University of Wisconsin, has been appointed lecturer in the department of economics, Indiana University, for the current academic year.

Marvin E. Rozen has been appointed instructor in economics at Stanford University.

Roy J. Sampson has been promoted to associate professor in the department of business administration at Pacific University.

Raymond J. Saulnier is on leave from Barnard College to serve as a member of the Council of Economic Advisers.

Joseph C. Schabacker has accepted an appointment as lecturer in business administration in the School of Business Administration, University of California, Los Angeles, for the current year.

Leon M. Schur has been promoted to assistant professor of business administration at Louisiana State University.

Sherman Shapiro, formerly of the University of Texas, has been appointed assistant professor of economics at Notre Dame University.

Ansel Sharp has resigned from Louisiana State University to accept a position at William Jewell College.

John A. Shubin has been promoted from assistant professor to associate professor of economics in the School of Commerce, Accounts and Finance, New York University.

Paul B. Simpson, formerly economist with the Federal Reserve Board of Governors in Washington, D.C., has been appointed professor of economics at the University of Oregon.

Joe Small has been appointed assistant professor of economics and business administration at Lafayette College.

A. Frederick Smith is acting assistant regional director of the Urban Renewal Administration, Housing and Home Finance Agency, Atlanta, Georgia.

Vernon L. Smith has been appointed assistant professor of economics at Purdue University.

Ezra Solomon has been promoted to associate professor of finance in the School of Business of the University of Chicago.

Lewis C. Sorrell, of the University of Washington, has accepted a visiting professorship in management theory and transportation for the current academic year in the School of Business Administration, University of California, Los Angeles.

Donald M. Soule, formerly of Humboldt State College, has been appointed assistant professor of economics at the University of Illinois.

Jared Sparks, Jr., has been appointed instructor in economics at Purdue University.

William F. Stanton, Jr., of the University of California, has accepted an appointment as acting assistant professor of business law in the School of Business Administration, University of California, Los Angeles, for the current academic year.

Robert W. Strain has resigned from Indiana University to accept a position at the University of Texas.

James H. Street has been promoted to associate professor of economics at Rutgers University.

Paul Streeten has been appointed fellow in political economy at the Johns Hopkins University for the term beginning February 1956.

Daniel B. Suits has been promoted to associate professor of economics at the University of Michigan.

Theodore A. Sumberg has accepted a six-month appointment as advisor on monetary policy to the Central Bank of Guatemala.

Theo Suranyi-Unger, of Syracuse University, was visiting professor at the University of Munich, Germany, in the summer of 1955.

Floyd Swann has been appointed instructor in the School of Business Administration management department at the University of Miami.

Milton C. Taylor, formerly of Marquette University, has joined the staff of the department of economics of the University of Wisconsin to work on an income tax study as a project associate.

Ralph I. Thayer has been appointed chairman of the department of economics at the State College of Washington.

William J. Thomas, associate professor of statistics and economics, has been named director of the Bureau of Business and Economic Research, Baylor University.

Kenneth Thompson is on leave from Louisiana State University this year to serve on the staff of the University of Maryland in its European program of college training for members of the U. S. Armed Forces.

Howard L. Timms has been promoted from faculty lecturer to associate professor of management in the School of Business, Indiana University.

Raymond R. Toledo has been appointed associate professor of business administration for the current year at the Immaculate Heart College of Los Angeles.

Leland E. Traywick has been designated assistant coordinator of Michigan State University's technical assistance program for Vietnam which is being carried on under contract with the Foreign Operations Administration.

Bertrum Trillich, of Texas Christian College, has been appointed assistant professor of marketing in the School of Business, University of Kansas.

Roy E. Tuttle has resigned from the University of Utah to accept a position at the University of Wisconsin.

Bernard Udis, of Princeton University, has accepted an appointment as assistant professor at the University of Tennessee.

Lyndall Urwick, an internationally known authority in the field of management, delivered five of the University of Minnesota Merrill Foundation Lectures in April and May.

Stefan Valavanis, of the University of Michigan, has been appointed assistant professor of economics at Northwestern University.

R. S. Van de Woestyne, professor of business administration, has been appointed acting dean of the School of Business, University of Chicago.

William F. Vendley has been promoted from associate professor to professor of accounting at Purdue University.

Peter Vukasin has been appointed visiting assistant professor of economics at Cornell University.

Robert F. Wallace has been promoted to professor of economics at the State College of Washington.

Richard J. Ward has been promoted to assistant professor of economics at Fordham University.

William J. Watkins has been appointed faculty lecturer in marketing in the School of Business, Indiana University.

Paul Weiner has been appointed instructor at Denison University.

Philip Wernette, of the University of Michigan, made a lecture tour of South American capitals in the spring of this year, at the invitation of the U. S. State Department. His lectures were on the topics of the Future Economic Progress of Latin America and Capitalism versus Communism.

Howard S. Whitney, formerly of Oklahoma A & M College, has been appointed assistant professor of agricultural economics at Texas A & M College.

Richard C. Wilcock has been promoted to associate professor of labor and industrial relations in the Institute of Labor and Industrial Relations, University of Illinois.

Edgar Williams has been promoted from assistant professor to associate professor of management in the School of Business, Indiana University.

Rufus Wixon, of the accounting department of the Wharton School, University of Pennsylvania, is serving as associate chief of party, Institute of Public and Business Administration, University of Karachi, Pakistan.

Thomas A. Yancey has been appointed instructor in the department of economics, University of Illinois.

Edwin Young has been promoted from associate professor to professor of economics at the University of Wisconsin. He is on leave this year to study international economic organizations in Brussels on a Ford grant.

John H. Young has been promoted to assistant professor of economics at Yale University.

FIFTY-SECOND LIST OF DOCTORAL DISSERTATIONS IN POLITICAL ECONOMY IN PROGRESS IN AMERICAN UNIVERSITIES AND COLLEGES

The present list specifies doctoral degrees conferred during the academic year terminating June 1955, and theses undertaken in the same period. In the latter category the year following the dissertation title is the probable date of completion.

Economic Theory; General Economics

Degrees Conferred

GARY S. BECKER, Ph.D. Chicago 1955. Discrimination: A theoretical and statistical study.

MARK BLAUG, Ph.D. Columbia 1955. The evolution of Ricardian economics in England.

RUSSELL A. HEADLEY, Ph.D. Pennsylvania 1955. Pessimism in economic thought.

JAMES M. HENDERSON, Ph.D. Harvard 1955. A short-run model for resources: with applications for coal.

JOHN H. HOAGLAND, Ph.D. Ohio State 1954. Charles Babbage, 1792-1871—industrial analyst.

CHIA CHUN HUNG, Ph.D. Washington 1955. A classification of market structures: theory and empirical implications.

BRYCE J. JONES, Ph.D. St. Louis 1955. Theories of economic stagnation.

LIONEL LERNER, Ph.D. Johns Hopkins 1955. Theories of imperialist exploitation.

BERTRAM F. LEVIN, Ph.D. Wisconsin 1955. Theories of the real rate of interest.

CH'UNG TAI LU, Ph.D. Maryland 1954. Elements of a theory of economic development of underdeveloped countries: a generalization of projected patterns of economic development in countries surveyed by the International Bank for Reconstruction and Development.

HOWARD T. LUDLOW, Ph.D. Fordham 1955. The Malthusian controversy: history of the theory of population in English economics from Malthus to Mill.

MOTHER RAYMOND MCKAY, Ph.D. Fordham 1955. Some similarities in the economic thinking of Sir James Steuart and John Maynard (Lord) Keynes.

LAWRENCE NABERS, Ph.D. California 1954. Alfred Marshall's system of economic reform.

SISTER MARY SILVERIUS SHIELDS, R.S.M., Catholic 1955. Some Irish contributions to the history of economics.

VERNON L. SMITH, Ph.D. Harvard 1955. A theoretical and empirical inquiry into the economic replacement of capital equipment.

RICHARD SPANGLER, Ph.D. California (Los Angeles) 1955. Reconsideration of short-run wage theory.

JEROME L. STEIN, Ph.D. Yale 1955. Economic theory and industrialization arguments.

ROBERT F. VOERTMAN, Ph.D. Texas 1955. Market expansion and economic development.

PINKNEY C. WALKER, Ph.D. Pennsylvania 1955. The interest theories of Böehm-Bawerk, Fisher and Keynes: a critique.

WILLIAM WARNTZ, Ph.D. Pennsylvania 1955. The geography of price—an attempt to develop a theory of the geographical variation of price using concepts measuring the space and time dimensions of certain economic phenomena.

Theses in Preparation

ROBERT E. BARCKLEY, B.S.C. North Dakota 1949; M.A. Columbia 1950. Theories of economic growth. 1955. *Illinois.*

RALPH B. BRISTOL, JR., B.A. Amherst 1952; M.A. Yale 1953. An investigation of the phenomenon of quality variation. 1956. *Yale.*

JOSEPH CAMMOROSANO, B.S. Fordham 1947; M.A. New York 1949. Keynes' contribution to international trade theory 1956. ***Fordham.***

EDWARD J. COOK, B.S. Fordham 1949; M.A. Columbia 1950. Macro-economic implications of the betterment factor. 1956. ***Fordham.***

GEORGE DALTON, B.A. Indiana 1950; M.A. Columbia 1951. Resource allocation under central planning: a theoretical critique. 1956. ***Oregon.***

LORETTA DUNPHY, B.C.S. Drake 1948; M.A. Catholic 1950. Simon Newcomb: his contribution to economic thought. 1956. ***Catholic.***

FRED L. GLIMP, JR., B.A. Harvard 1950. Economic development theory and international trade theory. 1956. ***Harvard.***

JOHN P. HENDERSON, B.A. California 1944. David Ricardo's theory of value as the classical macro theory of production. 1955. ***Maryland.***

LIONEL W. MCKENZIE, JR., B.A. Duke 1939; M.A. Princeton 1946. Application of activity analysis to the theory of general equilibrium. 1956. ***Princeton.***

JOHN M. B. MOSS, B.A. Trinity (Cambridge) 1952. Theory of capital and interest. 1956. ***Mass. Inst. of Technology.***

RICHARD R. NELSON, B.A. Oberlin 1952; M.A. Yale 1953. A theory of the nature of low level equilibrium in underdeveloped areas. 1956. ***Yale.***

BERNARD NEWTON, B.B.A. City (New York) 1944. The economics of Francis Amasa Walker: American economics in transition. 1957. ***Columbia.***

JOSEPH NORMILE, B.S. Cornell 1948; M.A. Catholic 1951. Analysis of the economic theories of Richard Ely and his contribution to the development of economic science in the United States. 1957. ***Catholic.***

BERNARD OKUN, B.A. Brooklyn 1953. A theoretical and empirical study of the pricing and production policies of the multi-product firm. 1956. ***Johns Hopkins.***

KYOHEI SASAKI, M.A. Tokyo Imperial 1944. Western influence on Japanese economic thought from 1920 to 1930. 1957. ***Columbia.***

C. MERYL SULLIVAN. Role of standardization in modern consumption theory. 1956. ***Georgetown.***

BENJAMIN T. TEETER. The stable share ratio. 1955. ***Georgetown.***

PETER R. TOSCANO, M.A. Chicago 1951. Economic thought in Milan and Tuscany, 1737-1800. ***Chicago.***

WILLIAM H. TRUMBO, B.A. Southeast Missouri State Teachers 1947; M.A. Missouri 1950. The measurement of monopoly. 1955. ***Colorado.***

FRANK ULLRICH, B.A. Innsbruch 1937; M.A. Fordham. The significance of Johann Karl Robertus in 19th century and contemporary economic thought. 1956. ***Fordham.***

FRANKLIN V. WALKER, B.A. California 1950; M.A. Harvard 1954. The criticism of the concept of balanced growth in economic development. 1955. ***Harvard.***

SHENG-WU WANG, B.A. Nat. Tsin Hua (China) 1943; M.A. Missouri 1951. Development of capital theory. 1957. ***Wisconsin.***

ROBERT M. WILL, B.A. Western Ontario 1953; M.A. Duke 1955. The development of economic science in Chile. 1956. ***Duke***

JAMES G. WITTE, B.A. Knox 1952; M.A. Indiana 1954. Automatic production and unemployment: A theoretical analysis. 1956. ***Indiana.***

EDWARD J. ZABEL, B.A. Syracuse 1950; M.A. Princeton 1953. The concept of capacity. 1956. ***Princeton.***

ARNOLD ZELLNER, B.A. Harvard 1949. Innovations and economic growth. 1956. ***California.***

Economic History; National Economies; Economic Development

Degrees Conferred

JAHANGIR AMOUZEGAR, Ph.D. California (Los Angeles) 1955. Iran and the Point Four program.

JOHN H. AUTEN, Ph.D. Mass. Inst. of Technology 1955. New Zealand and cyclical dependence, 1920-1939.

RAGHBIR S. BHATIA, Ph.D. Columbia 1955. The role of foreign investments in the economic development of India.

LEO V. BONNETT, George Washington 1955. Foreign exchange availability and Indian economic development.

ALICE E. BOURNEUF, Ph.D. Harvard 1955. Financing the Norwegian post-war investment program and the elimination of suppressed inflation.

MAURICE L. BRANCH, Ph.D. Wisconsin 1954. The paper industry in the lake states region, 1834-1947.

ESME Y.-Y. CHU, Ph.D. Radcliffe 1955. Economic development in Malaya: the problem in a plural society.

FINLEY M. CHU (FENG MING), Ph.D. Wisconsin 1955. China's old culture and new order.

DAVID C. CORBETT, Ph.D. McGill 1954. Immigration, population growth and the economic development of Canada.

H. JEROME CRANMER, Ph.D. Columbia 1955. The New Jersey canals: a study of the role of government in economic development.

HOWARD R. DELANCY, D.B.A. Indiana 1954. History of the Cole Motor Car Company.

DAVID FELIX, Ph.D. California 1955. Industrialization and chronic inflation in underdeveloped countries.

PAUL E. FENLON, Ph.D. Florida 1955. The struggle for control of the Florida Central Railroad (1867-1882): a case study of business enterprise in post-Civil War Florida.

JAMES P. GITTINGER, Ph.D. Iowa (Ames) 1955. Economic development through agrarian reform.

WILLIAM P. GLADE, JR. Ph.D. Texas 1955. The role of government enterprise in the economic development of underdeveloped regions. Mexico: a case study.

LOUIS-MARIE GOREUX, Ph.D. Chicago 1955. Agricultural productivity and economic development in France (1852-1950).

SAMUEL GOTTLIEB, Ph.D. Columbia 1955. The role of international specialization in the economic development of Turkey.

ISRAEL KUGLER, Ph.D. New York 1954. The woman's rights movement and the national labor union (1866-1872).

BENITO F. LEGARDA, JR., Ph.D. Harvard 1955. Foreign trade, economic change and entrepreneurship in the 19th century Philippines.

LELAND SUNG LIANG, Ph.D. Pennsylvania 1955. Problems of the cotton manufacturer in China.

TAGHI MORTAZAVI, Ph.D. Wisconsin 1955. Government in the economy of Iran 1925-1942.

KENJI OKUDA, Ph.D. Harvard 1955. The industrial development program in Puerto Rico, 1942-53.

ADAMANTIOS PEPELASIS, Ph.D. California 1954. Socio-cultural barriers to the economic development of Greece.

CHARLES E. ROLLINS, Ph.D. Stanford 1955. Raw materials development and economic growth: a study of Bolivian and Venezuelan experience.

WILLARD D. SHARPE, Ph.D. Harvard 1955. The economic policies of the popular front governments of France, 1936-38.

MORRIS SINGER, Ph.D. California 1955. Case studies in the policies of economic development: the experiences of New Zealand and Japan.

PEDRO C. M. TEICHERT, Ph.D. Texas 1955. Industrial development policy in Uruguay.

SYLVIA WISEMAN, Ph.D. McGill 1954. Planning of underdeveloped areas.

GENE L. WUNDERLICH, Ph.D. Iowa (Ames) 1955. The Bombay Tenancy and Agricultural Lands Act as a means of agrarian reform.

TARO YAMANE, Ph.D. Wisconsin 1955. Post-war inflation in Japan.

Theses in Preparation

Ribhi Abu El-Haj, B.A. American (Beirut) 1950; M.A. California (Los Angeles) 1951. Oil industry: a strategic factor in the economic development of Iraq. 1956. *Columbia.*

Walter Adamson, B.A. New York 1939; M.A. 1940; M.A. Fletcher School Law and Diplomacy 1953. A study in economic development. 1957. *Fletcher School Law and Diplomacy.*

Abdul Sahib Alwan, B. Com. Baghdad 1951; M.A. California (Los Angeles) 1953. Land policy and economic development in Iraq. 1956. *Wisconsin.*

Moin Uddin Baqui, B.A. Islamia (India) 1950; M.A. Punjam (India) 1952. The general theory of fiscal and monetary controls as modified in their application to conditions in underdeveloped countries; with particular reference to Pakistan. 1956. *Kansas.*

Roy J. Cameron, B.Ec. Adelaide (Australia) 1948; M.A. 1951. Inflation in a dependent economy: Australia, 1945-52. 1956. *Harvard.*

Henry P. Caulfield, B.S. Harvard 1940; M.P.A. 1949. British iron and steel industry. *Harvard.*

Charles Conklin, B.A. Waynesburg 1941; M.A. Pittsburgh 1950. Economic history of the northern sections of the West Virginia pan-handle. 1956. *Pittsburgh.*

Mary E. Craig, B.A. North Carolina 1947; M.A. 1950. A history of the North Carolina furniture industry with special reference to locational factors. 1956. *Duke*

Lance E. Davis, B.A. Washington 1952; M.A. 1953. The sources of finance for American industry prior to the Civil War. 1956. *Johns Hopkins.*

Norton T. Dodge, B.A. Cornell 1948; M.A. Harvard 1951. The Soviet tractor industry and the mechanization of agriculture. 1955. *Harvard.*

Harold B. Ehrlich, B.A. Rutgers 1950; M.A. 1951. Planning under nationalization: British theory and practice. 1956 *Rutgers.*

Donald A. Fink, B.A. Yale 1952; M.A. 1954. The economic significance of technological innovation at the Inland Steel Company since 1900. 1956. *Yale.*

Milton L. Glick, B.A. New York 1949; M.A. Chicago 1951. The effects of economic development on the returns to labor in Mexican agriculture. *Chicago.*

Sonia Gold, B.A. Hunter 1938. Role of government in private enterprise as evidenced by programs of the World Bank. 1956. *Pittsburgh.*

Leon Hollerman, B.A. Rochester 1939. Viability of the Japanese economy, with special consideration of international trade problems. 1957. *California.*

Conrado E. Hunter, B.S. McGill 1951; M.A. Harvard 1953. Canada's conduciveness to Latin American economic development. *Harvard.*

William L. Ivey, B.S. Alabama Poly. Inst. 1948; M.S. North Carolina 1951. American labor and national issues 1827-1954. 1956. *North Carolina.*

Nancy J. Kenney, B.A. Swarthmore 1951; M.A. Fletcher School Law and Diplomacy 1953. The economic ideas of Gandhi and Indian economic planning. 1957. *Fletcher School Law and Diplomacy.*

Frederick V. Loud, B.A. Harvard 1929. Mobilization of development finance in the Arab Middle East. 1957. *Columbia.*

Ragaei Wm. El Mallakh, B.C. Fouad (Egypt) 1949; M.A. Rutgers 1951. Effects of the second world war on the economic development of Egypt. 1955. *Rutgers.*

Ruth L. Metzger, B.A. Bryn Mawr 1950. French monetary problems and policies since 1945. 1956. *Harvard.*

Benjamin A. Michalik, B.A. St. Joseph 1940; M.A. Fordham 1942. The Lehigh Coal and Navigation Company 1913-53. An economic analysis of the anthracite coal industry. 1956. *Fordham.*

John J. Murphy, B.A. Catholic 1952; M.A. Yale 1954. The foundation and development of two Massachusetts waterpower industrial valleys: a comparative historical study. 1956. *Yale.*

Frederick T. Neely, B.S. Virginia 1950; M.A. 1951. Financial history of Virginia, 1776-1861. 1956. ***Virginia.***

Om Prakash Nijhawan, B.A. East Punjab (India) 1950; M.A. Nebraska 1954. A pragmatic framework for the industrialization of India. 1956. ***Nebraska.***

Pius N. Okigbo, B.A. London School of Economics 1946; B.S. 1949. Capital formation and economic development in Nigeria. 1956. ***Northwestern.***

H. A. Oluwasanmi, B.A. Morehouse 1951. Nigerian agriculture: a study in farming organization with special reference to technical and economic development. 1955. ***Harvard.***

Bernard Z. Orzech, B.S. California 1950. The role of economic fluctuations in the growth of the German economy, 1873-1914. 1957. ***California.***

Algimantas Petrenas, Dipl. rer. pol. Hamburg 1949. The process of economic growth in a controlled economy. 1957. ***Columbia.***

George M. Powell, B.A. Arkansas 1950; M.A. Minnesota 1951. Use of commercial policy for economic development in selected countries. 1955. ***Illinois.***

Gustav Ranis, B.A. Brandeis 1952; M.A. Yale 1953. Japan—capital accumulation and economic development. 1956. ***Yale.***

Ronald G. Ridker, B.A. California 1952; M.A. Fletcher School Law and Diplomacy 1953. Developmental planning in Norway. 1957. ***Wisconsin.***

Gaston V. Rimlinger, B.A. Washington 1951. A comparative study of the pattern of trade union formation in the beginning of industrialization in the U. S., England, France, Germany and Russia. 1956. ***California.***

Sheldon Schaffer, B.A. Iowa 1943; M.A. Yale 1947. Adjustment to technological product change; an industrial history of the Graton and Knight Company. 1956. ***Yale.***

Hubert Schiffer, S.J., Lic. St. Miki (Japan) 1945; M.A. Fordham 1952. Postwar reconstruction of the Japanese banking system. 1956. ***Fordham.***

Hans O. Schmitt, B.A. California 1952. The role of monetary policy in the economic development of southeast Asia. 1956. ***California.***

Sister Genevieve Louise Sheehan, B.S. St. Rose 1937; M.A. Catholic 1944. A synopsis and evaluation of the theories dealing with the economic decline of Rome. 1956. ***Fordham.***

Barry Siegal, B.A. California 1951. Banking policy and economic development: case study of Mexico. 1956. ***California.***

Robert G. Spiegelman, B.S. California 1949; M.A. 1953. The role of the tariff in India's industrial development. 1956. ***Columbia.***

W. Paul Strassman, B.A. Texas 1949; M.A. Columbia 1950. Risk and technological innovation in producers' goods, 1820-1885. 1956. ***Maryland.***

Stefan Stykolt, B.A. Toronto 1946; M.A. Harvard 1949. British overseas investments as a factor in Canadian economic development. 1867-1913. ***Harvard.***

Philip S. Thomas, B.A. Oberlin; M.A. Michigan. Foreign capital in the economic development of India. 1957. ***Michigan.***

Stokes M. Tolbert, B.A. Yale 1948; M.A. Harvard 1950. Central banking and economic development: a case study of India. 1955. ***Harvard.***

Robert L. West, B.A. Yale 1948; M.A. 1950. Kenya in the British Empire; problems of economic policy between the world wars. 1956. ***Yale.***

Elmus R. Wicker, B.A. Louisiana State 1946; M.A. 1948; B. Phil. Oxford 1951. The Colonial Development Corporation 1948-1953. 1955. ***Duke.***

Kung-Chia Yeh, LL.B. National Tsing Hua (China) 1948; M.B.A. Columbia 1952. The changing structure of import trade in the course of economic development. 1957. ***Columbia.***

Statistics and Econometrics

Degrees Conferred

ROBERT L. BASMANN, Ph.D. Iowa (Ames) 1955. Application of several econometric techniques to a theory of demand with variable tastes.

NATHAN GOLDFARB, Ph.D. New York 1955. Longitudinal statistics—their quality and application.

DELBERT C. HASTINGS, Ph.D. Minnesota 1954. A monthly index of regional business activity based on net product measurement.

JOHN R. MEYER, Ph.D. Harvard 1955. Business motivation and the investment decision: an econometric study of post-war investment patterns in the manufacturing sector.

Theses in Preparation

LOUIS P. CECCHINI, B.A. Wesleyan 1942; M.A. 1944. The historical development of time series analysis. 1957. *Catholic.*

ED. F. CRIM, B.S. Oklahoma 1943; M.S. Illinois 1953. Temporal relations among economic variables and contra-cyclical economic policy. 1955. *Illinois.*

FREDERICK O'R. HAYES, B.A. Hamilton 1947; M.A. Harvard 1949; M.P.A. 1948. The time relation between input and output flows in investment goods industries. *Harvard.*

GEORGE W. LADD, B.S. South Dakota State 1950; M.A. Michigan State 1951. Regressions in econometric models under different assumptions concerning the nature of the data. 1955. *Illinois.*

RICHARD E. QUANDT, B.A. Princeton 1952; M.A. Harvard 1955. Probability in economic theory and statistical inference in input-output analysis. 1956. *Harvard.*

THOMAS E. YANCEY, B.S. Missouri 1948; M.A. 1949. Economic relations under different assumptions concerning price flexibility. 1955. *Illinois.*

Economic Systems; Planning and Reform; Cooperation

Degrees Conferred

MOHAMED ABD EL-WADOOD KHALIL, Ph.D. Wisconsin 1955. The relationship of the business cycle to the organization of cooperative associations.

Theses in Preparation

JOHN E. ELLIOTT, B.A. Occidental 1952. A critique of current theories of economic planning. 1956. *Harvard.*

LEMONT K. RICHARDSON, B.A. Wisconsin 1952; M.A. Cornell 1953. A history of the rural electric cooperatives in Wisconsin. 1956. *Wisconsin.*

National Income and Social Accounting

Degrees Conferred

JOHN W. KENDRICK, George Washington 1955. The meaning and measurement of national productivity.

EDWIN MANSFIELD, Duke 1954. City size and income, 1949.

T. HARRY MCKINNEY, Ph.D. Oklahoma 1955. Methods of estimating wages and salaries in the counties of Oklahoma.

HARLOW D. OSBORNE, Ph.D. Georgetown 1955. Economic foresight and gross national product models.

KEHAR SANGHA, Ph.D. Oklahoma 1955. An analysis of wages and value added by manufacture in Oklahoma.

Theses in Preparation

ROBERT A. BANDEEN, B.A. Western Ontario, 1952. State per capita incomes and automobile expenditures, 1940-1950. 1955. *Duke.*

THOMAS J. FINN, B.A. Boston 1951; M.A. Harvard 1954. Factors influencing the level of national income in the United States, 1945-54. 1956. *Harvard.*

PAUL E. NELSON, B.B.A. Oklahoma 1951; M.B.A. 1952. The allocation of transfer payments in Oklahoma by county. 1956. *Oklahoma.*

FRANK PINET, B.S. Kansas 1942; M.B.A. 1947. Forms in which Kansans hold their wealth at time of death. 1955. *Kansas.*

WALTER A. SPIVEY, B.A. North Carolina 1950; M.A. 1952. Income payments in North Carolina counties, 1939-1950. 1955. *North Carolina.*

Business Fluctuations; Prices

Degrees Conferred

VIRGINIA G. FLAGG, Ph.D. California 1955. Business fluctuations and the automobile industry.

EDWIN KUH, Ph.D. Harvard 1955. An econometric investigation of accelerator and profit theories of investment.

ELMER P. LOTSHAW, Ph.D. Iowa 1955. Inflation—an equilibrating process.

Theses in Preparation

JULIUS W. ALLEN, B.S. Iowa 1937; M.A. American 1948. Economics of the Employment Act of 1946. 1956. *Johns Hopkins.*

THOMAS F. DERNBURG, B.A. Swarthmore 1952; M.A. Yale 1953. The acceleration principle in business cycle theory. 1956. *Yale.*

LYLE E. GRAMLEY, B.A. Beloit 1951; M.A. Indiana 1952. Long-term investment opportunities and the major-minor cycle dichotomy. 1955. *Indiana.*

DOUGLAS G. HARTLE, B.A. Carleton 1950; M.A. Duke 1954. Employment forecasting, by industry, in Canada. 1956. *Duke.*

EDWARD G. KOCH, B.S. New York 1937; M.B.A. Michigan 1954. Business planning and economic policy: their significance in the 1953-54 recession. 1956. *Michigan.*

JAMES P. LOGAN, B.A. Princeton 1943; M.B.A. Harvard 1949. The use of forecasts in business planning. 1957. *Columbia.*

ALVIN E. MULANAX, B.S. Kansas State 1946; M.S. 1951. A study of business failures and their relation to general business conditions. 1956. *Ohio State.*

DELMAR D. RAY, B.A. Western Kentucky State 1936; M.B.A. Chicago 1947. An evaluation of accounting: methodology as an accentuating factor in business fluctuation. 1956. *Florida.*

CHARLES D. SMITH, B.A. Swarthmore 1950. The countercyclical potential of state and fiscal action. 1956. *Cornell.*

HENRY THOMASSEN, B.Ed. Alberta 1951; B.Sci. 1953; M.A. Stetson 1954. The implications of business planning for economic stability in the United States. 1956. *Nebraska.*

Money and Banking; Short-Term Credit; Consumer Finance

Degrees Conferred

BERNARD J. BIENVENU, D.B.A. Harvard 1955. The function of the board of directors of smaller commercial banks.

ROBERT P. BLACK, Ph.D. Virginia 1955. An analysis of the impacts of the 1953 and 1954 reductions in Federal Reserve member bank reserve requirements.

HARRY BRANDT, Ph.D. Columbia 1955. U.S. monetary and credit policies between the end of World War II and the outbreak of the Korean war.

KOLLENPARAMPIL CHACKO CHACKO, Ph.D. New York 1955. The monetary and fiscal policy of India.

SHIH-CHEN CHEN, Ph.D. Illinois 1955. A proposed banking system for China with special reference to the system of the United States.

WILLIAM H. FICHTHORN, D.B.A. Harvard 1955. Retail store charge account services offered by commercial banks.

CHARLES F. HAYWOOD, Ph.D. California 1955. The implementation of monetary policy, with special attention to the availability of credit.

G. T. HUCHAPPA, Ph.D. New York 1955. The Reserve Bank of India and the money market.

JOHN J. KLEIN, Ph.D. Chicago 1955. German monetary development 1932-1944.

ROBERT P. LUMPKIN, Ph.D. Harvard 1955. Bank capital: problems and policies.

HERBERT H. MITCHELL, Ph.D. North Carolina 1954. The development of commercial banking in North Carolina, 1865-1935.

LEON M. SCHUR, Ph.D. Wisconsin 1955. Central bank inflation control—American experience 1780-1929.

ARTHUR J. R. SMITH, Ph.D. Harvard 1955. The growth of public and private debt in the United States, 1914-48.

AUBREY N. SNELLINGS, Ph.D. Virginia 1955. The development of monetary policy in West Germany, 1948-1953.

LOUIS M. SPADARO, Ph.D. New York 1955. Salvation through credit reform: an examination of the doctrines of Proudhon, Solvay, and C. H. Douglas.

HAROLD L. SPAIN, Ph.D. California 1954. A history and appraisal of the real-balance doctrine.

THOMAS I. STORRS, Ph.D. Harvard 1955. An evaluation of credit control tools.

GEORGE M. TAOKA, Ph.D. Columbia 1955. The role of the Bank of Japan in the administration of the economic and financial controls of the government during national emergencies.

STOKES M. TOLBERT, Ph.D. Harvard 1955. Central banking and economic development: a case study of India.

CHARLES E. WALKER, Ph.D. Pennsylvania 1955. Federal Reserve policy and the government security market.

HAROLD WOLOZIN, Ph.D. Columbia 1955. The control of consumer credit from 1941 to 1949.

PETE ZIDNAK, Ph.D. Southern California 1955. Arizona's small loan problem.

Theses in Preparation

NICHOLAS BALABKINS, Dipl. rer. pol. Goettingen (Germany) 1949; M.A. Rutgers 1953. The currency reform of West Germany in 1948. 1956. *Rutgers.*

A. Balbach, B.A. California (Los Angeles). Availability conditions of bank credit. 1958. *California (Los Angeles)*.

Milton F. Bauer, B.A. Western Ontario 1947; M.A. Toronto 1949. The credit union movement in the Province of Quebec. *Chicago*.

Don C. Bridenstine, B.S. Oregon 1947; M.A. California (Los Angeles) 1954. A history of commercial banking in Arizona. 1956. *Southern California*.

Carrol W. Ehlers, B.S. Colorado 1942; M.S. 1949. Survey in the field of consumer credit in Indiana. 1956. *Indiana*.

O. Rogers Flynn, Jr., B.S. Columbia 1921. A preliminary study of the relationship of capital strength and risk position of 208 large commercial banks in the United States at December 31, 1938; December 31, 1945; December 31, 1952. 1956. *Columbia*.

Matthew H. Jonas, B.A. California (Los Angeles) 1950; M.A. 1951. The nature, behavior and significance of savings (time) deposits. 1957. *California*.

Joseph A. Kehoe, C.S.C., B.A. Notre Dame 1933; M.A. 1941. Selected financial trends of commercial banks of Indiana, 1915-1954. 1956. *Catholic*.

Orlando H. Lobo, B.A. California 1951. Monetary measures and the capital market. 1957. *California*.

Charles F. Meehling, B.A. Brooklyn 1947. An analysis of federal credit unions in the United States. 1956. *New York*.

Allan H. Meltzer, B.A. Duke 1948. Monetary problems of French inflation 1939-54. 1958. *California (Los Angeles)*.

Boris P. Pesek, B.A. Coe 1952. Monetary policy of Czechoslovakia, 1945-1953. *Chicago*.

Robert W. Strain, M.B.A. Louisiana State 1949; B.B.A. Texas Technological. Life with the Lincoln, a history of the Lincoln National Life Insurance Company, 1905-1955. 1955. *Indiana*.

Gamil Tewfik, B. Com. Alexandria 1948; M.A. Minnesota 1951. A study of Minnesota credit unions with consideration of adaptability of such institutions to underdeveloped countries, 1955. *Minnesota*.

Thomas E. Van Dahm, B.A. Hope 1948; M.A. Michigan 1949. Bank behavior and monetary policy. 1956. *Michigan*.

John E. Van Tassel, B.A. Boston 1950; M.A. 1953. An analysis of American banking practices. 1956. *Harvard*.

Nassrollah Vaqar, Lic. in Law, Tehran 1943. An evaluation of the liquidity of the assets of commercial banks for selected years. 1955. *Kansas*.

Mark L. Wehle, B.S. Harvard 1937. The level of long-term interest rates in relation to business cycles. 1956. *Columbia*.

Business Finance; Investments and Security Markets; Insurance

Degrees Conferred

Keith L. Broman, Ph.D. Nebraska 1955. Some effects of non-contributory pension plans on the financial policy of corporations.

Jack W. Cashin, Ph.D. Texas 1955. History of savings and loan associations in Texas.

Robert S. Cline, Ph.D. Pennsylvania 1955. Valuation of life insurance assets.

John R. Dier, Ph.D. New York 1955. The sale of securities through privileged subscriptions.

Jesse Gloster, Ph.D. Pittsburgh 1955. North Carolina Mutual Life Insurance Company.

Mark Green, Ph.D. Ohio State 1955. An analysis of credit insurance.

Roy J. Hensley, Ph.D. California 1955. An evaluation of economic performance of the property insurance industry.

Kenneth W. Herrick, Ph.D. Pennsylvania 1955. Total disability provisions in life insurance policies.

Harris Loewy, Ph.D. Wisconsin 1954. The flow of net cash savings through life insurance companies.

John L. O'Donnell, D.B.A. Indiana 1954. The financial operations of a regional investment bank.

Peter C. Peasley, Ph.D. Fordham 1955. The Investment Company Act of 1940; background, critical appraisal and recommendations for change.

Clayton J. Pilcher, Ph.D. Michigan 1955. Convertible bonds and preferred stocks; an analysis and evaluation of their role as capital raising instruments.

Max Richards, Ph.D. Illinois 1955. Intermediate credit and loan capital for small business.

Harold W. Snider, Ph.D. Pennsylvania 1955. Investment in commercial real estate by life insurance companies.

Robert M. Stevenson, D.B.A. Indiana 1955. Major medical expense insurance.

Lester B. Strickler, D.B.A. Indiana 1954. Financing of certain trucking companies from 1940 to 1952.

Joseph F. Trosper, D.B.A. Indiana 1954. A case study of the effect of group life insurance on the ownership of individual life insurance.

James Wert, Ph.D. Ohio State 1954. Sources of equity capital for the small businessman.

Theses in Preparation

Stephen H. Archer, B.A. Minnesota 1949; M.A. 1953. Life insurance companies and the variable annuity. 1956. *Minnesota.*

Oliver D. Dickerson, B.S. Pennsylvania 1948; M.B.A. 1951. Guaranteed renewable disability insurance. 1955. *Pennsylvania.*

Monroe Fischer, B.A. Duke 1937; M.A. 1938. The effect of insider activity upon common stock prices. 1956. *American.*

Walter T. Greaney, Jr., B.A. Boston College 1943; LL.B. Boston University 1948; LL.M. 1949; M.A. Harvard 1955. Effects of corporation income tax on corporate investment and operational policy. 1956. *Harvard.*

Richard J. Kruizenga, B.A. Hope 1952. Price expectations in financial markets. 1956. *Mass. Inst. of Technology.*

Howard C. Launstein, B.A. Michigan State 1947; M.A. 1948. The development of financial statements for management of casualty insurers. 1955. *Ohio.*

Jack H. Mathews, B.S. Kansas 1948; M.B.A. Indiana 1953. Cash working capital requirements in regulated companies. 1956. *Indiana.*

Edward A. Nelson, B.S. De Paul 1948; M.B.A. Chicago 1949. Analysis of the stock of life insurance companies as investments. 1956. *Missouri.*

Joseph Newhouse, B.S. West Virginia 1949; M.A. 1951. The investment banking case: an economic and legal analysis. 1956. *Cornell.*

Melville Peterson, B.S. Washington (St. Louis) 1943; M.S. 1948. A comparative study in debenture and mortgage bond financing. 1955. *Illinois.*

Charles B. Saunders, B.S. Alabama 1942; M.A. 1949. Promotional methods now used by various financial instiutions to secure equitable capital. 1956. *Indiana.*

Jerome Zoffer, B.A. Pittsburgh 1952; M.A. 1953. History and methods of automobile liability insurance rate-making. 1956. *Pittsburgh.*

Public Finance

Degrees Conferred

ALEXANDER S. BALINKY, Ph.D. Harvard 1955. Albert Gallatin: Republican financier.

ALPHA CHUNG-I CHIANG, Ph.D. Columbia 1954. Income taxation in the federal state: a study of jurisdictional conflict.

JOHN M. FIRESTONE, Ph.D. Columbia 1955. Cyclical behavior of federal receipts and expenditures: 1879-1949.

GLENN W. FISHER, Ph.D. Wisconsin 1954. State individual income tax jurisdiction: a study of unneutral taxation.

JAMES E. HOWELL, Ph.D. Yale 1955. Federal fiscal policies and the regional economy: a study of distributive impact, 1950 and 1953.

ROBERT N. HOWELL, Ph.D. North Carolina 1954. A critical study of the application of the principle of the net income tax in North Carolina.

NORMAN H. JONES, JR., Ph.D. Iowa 1954. The regional redistribution effects of federal revenues and expenditures.

HAROLD Q. LANGENDERFER, D.B.A. Indiana 1954. The federal income tax: 1861-1872.

ROSALIE B. LEVINE, Ph.D. Wisconsin 1955. State-local fiscal relations: the New York and Wisconsin systems.

DAVID E. SHIRLEY, Ph.D. Southern California 1955. Economic and administrative aspects of capital budgeting in municipalities.

Theses in Preparation

LEWIS C. BELL, B.A. Berea 1953; M.A. Emory 1954. An analysis of third-structure taxes for highway use with special reference to their applicability to Kentucky. 1956. ***Kentucky.***

DWIGHT S. BROTHERS, B.A. Colorado 1951; M.A. Princeton 1954. Capital consumption allowances as an object of public policy in the United States. 1956. ***Princeton.***

DEANE C. CARSON. Treasury refinancing and monetary management: 1954-55. 1956. ***Clark.***

LEO COHEN, B.S. California (Los Angeles) 1950; M.A. 1953. The federal budget as a tool for economic policy: a suggested framework. 1956. ***California (Los Angeles).***

SEYMOUR FIEKOWSKY, B.A. Wayne 1942; M.A. Harvard 1948. Economic effects of death taxes. 1955. ***Harvard.***

JACK E. GELFAND, B.A. Brooklyn 1943; M.A. 1948. The avoidance of personal income taxes in the United States. 1956. ***New York.***

ROBERT K. KINSEY, B.A. Indiana 1949. An exploration into the possibilities of incorporating a national lottery into our tax system. 1957. ***Columbia.***

MICHAEL E. LEVY, B.A. Hebrew 1952. The impact of secular inflation on the tax system. 1957. ***Columbia.***

HUGH H. MACAULAY, B.S. Alabama 1947; M.S. 1948. Tax-favored income, the economy and public finance. 1956. ***Columbia.***

WILLIAM J. MCKINSTRY, B.A. Michigan State 1943; M.A. Columbia 1947. Some aspects of the redistributive effects of the federal estate tax. 1956. ***Yale.***

ALBERT M. MOORE, B.A. Queens (Ontario) 1949. The tax treatment of the Canadian oil extraction industry. ***Chicago.***

HECTOR J. RIVERA, B.A. Puerto Rico 1945; M.A. New York 1949. Puerto Rican income tax. 1957. ***New York.***

OLIVER L. ROBINSON, B.A. Wesleyan 1952; M.A. Yale 1953. Economic effects of tax depletion allowances. 1956. ***Yale.***

CHING-SHENG SHEN, B.A. Yen-Ching (China) 1941; M.A. Boston 1951. State revenue forecasts. 1956. ***North Carolina.***

JERRY P. SIMPSON, B.A. North Texas State 1950; M.A. 1951. Oklahoma's state indebtedness 1956. *Oklahoma.*

JOEL D. SINGER, B.A. Duke 1946. The fiscal process in the United Nations. 1956. *New York.*

WILBUR A. STEGER, B.S. Yale 1950; M.A. Harvard 1952. Averaging of income for income tax purposes. 1955. *Harvard.*

KERMIT WATKINS, B.A. William Jewell 1931; M.S. Colorado State 1932. Economic implications of state aid to local government in Kansas. 1955. *Kansas.*

WILLIAM J. WEISKOPF, B.A. New York 1942; M.P.A. 1947. An appraisal of the Ohio axle-mile truck tax. 1956. *New York.*

International Economics

Degrees Conferred

CHARLES S. BENSON, Ph.D. Columbia 1955. Short-term fluctuations in U.S. imports of apparel wool: a case study of a marginal import.

STERIE T. BEZA, Ph.D. Harvard 1955. Some aspects of productivity and the balance of payments.

FREDERICK A. BREIER, Ph.D. California 1955. The development of United States policies and attitudes toward western European exchange control.

MARCUS C. BRUHN, Ph.D. Wisconsin 1955. Sweden's balance of payments, 1920-1950.

EDWARD C. FEI, Ph.D. Washington 1955. A study of the balance of payments of Lebanon, 1951 and 1952.

WILLIAM C. FREUND, Ph.D. Columbia 1955. The concept and practice of equal treatment in U.S. commercial policy.

GEORGE GIBBS, Ph.D. California 1955. Economic significance of the reciprocal trade agreement program to California production and trade.

ASHER HALPERIN, Ph.D. Princeton 1955. Palestine's balance of international indebtedness 1930-1947.

FRANCES S. HARDIN, Ph.D. Colorado 1954. Economic and political effects of restrictions by the Department of Agriculture on United States foreign trade in agricultural commodities.

ABUL MAALI MOHAMMED MOAZZAMUL HUQ, Ph.D. Harvard 1955. The international aspects of U.S. demand for basic industrial raw materials.

GEORGE MASAO IWANAKA, Ph.D. Wisconsin 1955. Postwar German balance of payments.

RAYMOND C. JANCAUSKAS, S.J., Catholic 1955. An evaluation of the International Monetary Fund.

HEINZ JAUCH, Ph.D. Columbia 1955. American foreign trade and domestic industrial organization.

ENRIQUE LERDAU, Ph.D. Wisconsin 1955. International trade and finance in New Zealand—1930 to 1945.

MICHAEL MICHAELY, Ph.D. Johns Hopkins 1955. Devaluation and dual markets under inflation with direct controls.

JOHN C. MURPHY, Ph.D. Chicago 1955. Long term contracts for the export of Denmark's butter and bacon.

ROBERT RABOLD, Ph.D. Pittsburgh 1955. Invisible items in international trade.

HANS F. SENNHOLZ, Ph.D. New York 1955. Inquiry into the problems of international cooperation and European unification.

MATTHEW SIMON, Ph.D. Columbia 1955. Cyclical fluctuations and the international capital movements of the United States, 1865-1897.

WILLIAM F. STANTON, JR., Ph.D. California 1955. The Food and Agricultural Organization of the United Nations and international food policy.

ROBERT W. STONE, Ph.D. Virginia 1955. Belgium in post-war intra-European trade and payments.

JAMES A. STORER, Ph.D. Harvard 1955. Foreign trade policies of the Philippine Republic.

ROGER W. WEISS, Ph.D. Chicago 1955. The British exchange controls 1939-1952: a study in discretion and discrimination.

DAVID A. WILSON, Ph.D. California 1955. An analysis of lumber exports from the coast region of British Columbia to U.S. and United Kingdom 1920-1952.

SHU-CH IN YANG, Ph.D. Wisconsin 1954. Thailand's experience with multiple exchange rates.

Theses in Preparation

EDWIN E. BOEVENTER, B.A. Goettingen 1952; M.A. Michigan 1954. The impact of the last three recessions on the American balance of payments. 1956. *Michigan.*

WILLIAM BRYAN, B.A. Wayne 1948; M.A. 1950. The economics of the Anglo-Iranian oil dispute. 1956. *Wisconsin.*

FERGUS J. CHAMBERS, B.A. Western Ontario 1952; M.Sc. London (England) 1954. Post-war Canadian commercial policy. 1957. *Toronto.*

ANDRE L. DANIERE, Bacc. Math. Lyon 1943. Ingenieur Inst. Nat. Agronomique (Paris) 1948; M.S. Massachusetts 1950. Tests of efficiency for alternative patterns of development and trade. 1956. *Harvard.*

MAURICE C. ERNST, B.A. Yale 1948. Italy in the post-war world economy. 1956. *Columbia.*

THOMAS A. GOLDMAN, B.A. Harvard 1939; M.A. George Washington 1952. International specialization and factor prices. *Chicago.*

JOHN M. GUNN, JR., B.S. Georgia Inst. of Tech. 1949; M.A. Princeton 1954. A critical survey of the literature dealing with flexible rates of international exchange. 1955. *Princeton.*

DUKH HARAN NATH GURTOO, B.A. Allahabad 1936; B.Sc. London, 1941. India's balance of payments. 1956. *Princeton.*

GERALD E. HARRIMAN, B.S. Notre Dame 1947; M.A. South Dakota 1949. The economics of the transition between protectionism and free trade. 1956. *Cincinnati.*

JACQUELINE L. HODGSON, B.S. Puget Sound 1951; M.A. 1952. The trend of partial terms of trade of certain primary producing countries. 1956. *Wisconsin.*

ARCADIUS KAHAN, Dipl. in Law and Econ. Wilno (Poland) 1938; M.A. Rutgers 1954. A study of the price-elasticity of American demand for imported strategic raw materials. 1956. *Rutgers.*

CHI-LING LEE, B.A. Nat. Central (China) 1944; M.A. Wisconsin 1953. Flexible exchange rates and adjustment of payment. 1955. *Wisconsin.*

JONATHAN LEVIN, B.S. Columbia 1950; M.A. Fletcher School Law and Diplomacy 1951. Systems of export taxation in export economics. 1956. *Fletcher School of Law and Diplomacy.*

GEORG MARAIS, B. Com. Stellenbosch (S. Africa) 1951; M. Comm. 1953. Foreign trade of the Union of South Africa from 1926 to 1952. 1956. *Wisconsin.*

MILDRED G. MASSEY, B.A. California 1942; M.A. Oregon 1951. The Italian international balance of payments, 1945-1954. 1956. *Oregon.*

SARAH S. MONTGOMERY, B.A. Vassar 1951; M.A. Columbia 1952. The terms of trade of primary products and manufactured goods in world trade, 1870-1954. 1955. *Wisconsin.*

JEROME M. PINES, B.S. New York 1935; M.A. Columbia 1936. American economic policy toward Germany, 1945-1955. 1957. *Columbia.*

EMILE E. QUEVRIN, LL.D. Louvain (France); Lic. Sc. Econ. 1953. The terms of trade and economic development. 1956. *Princeton.*

GRANT L. REUBER, B.A. Western Ontario 1950; M.A. Harvard 1954. Changes in Anglo-Canadian trading patterns. 1955. *Harvard.*

ROBERT J. SCHWARTZ, B.S.S. City (New York) 1941; M.A. Columbia 1943. Obstacles to United States private foreign investment, 1947-1953. 1956. *American.*

JOSEPH F. TALARICO, B.A. Rutgers, 1949; M.A. 1951. Post-war commercial and financial relations between United States and Canada. 1955. *Rutgers.*

TEIMOOR M. VAZIRI, Lic. Econ. Tehran 1947; M.A. Indiana 1951. The economic relations of Iran and America since World War II. 1956. *New York.*

PAUL WELLS, B.A. Washington 1949. A general equilibrium analysis of trade, transfers and tariffs. 1955. *Stanford.*

RAYMOND E. ZELDER, B.A. Harvard 1950; M.A. Chicago 1951. The terms of trade, 1921-1938. *Chicago.*

Business Administration

Degrees Conferred

RICHARD BERGER, Ph.D. New York 1955. The marketing impact of 3-D.

HAROLD J. BIERMAN, Ph.D. Michigan 1955. The effect of inflation on depreciation and the computation of income of public utilities for the years 1940 to 1953.

PHILIP S. BORDEN, D.B.A. Harvard 1955. The marketing process in a large industrial organization.

SISTER ISADORE BROWN, O.S.U. Catholic 1955. The historical development of the use of ratios as applied to financial analysis.

REX V. CALL, Ph.D. Ohio State 1955. The wholesale distribution of meat products with special reference to Omaha, Nebraska as a meat packing center.

KENNETH R. DAVIS, Ph.D. Chicago 1955. Marketing by wood household furniture manufacturers: a critical evaluation.

ALICE G. DORWORTH, Ph.D. New York 1955. Shifts in the channels of distribution of selected consumer commodities.

DANIEL C. HAMILTON, Ph.D. Columbia 1954. The gulf coast refinery market from 1925 to 1950: a study in market behavior.

ARTHUR HIGHMAN, Ph.D. Chicago 1954. The self-administered questionnaire as a technique for measuring the market position of a brand: a critical appraisal.

CHARLES HORNGREN, Ph.D. Chicago 1955. Implications for accountants of the uses of financial statements by security analysts.

THOMAS ISAACK, D.B.A. Indiana 1955. Management problems of selected small machine tool firms during a national emergency.

LOUIS H. JORDAN, Ph.D. Columbia 1954. Financial accounting standards.

WALTER P. KENNON, Ph.D. Chicago 1954. The variables which affect costs and how economists and managers evaluate the effect of these variables in the determination of production functions and standard costs.

MAYBELLE KOHL, Ph.D. Columbia 1954. The role of accounting in pricing.

HARRY A. LIPSON, Ph.D. Pennsylvania 1955. The development of multiple-unit large department store investment-management systems 1920-1953; selected case studies.

KULLERVO LOUHI, Ph.D. Chicago 1955. Financial accounting and managerial accounting: some points of contrast.

MILTON P. MATTHEWS, Ph.D. New York 1955. An analysis of drug retailing in Utah.

WILLIAM C. MCINNES, S. J., Ph.D. New York 1955. A general theory of marketing.

ADRIAN F. MURPH, Ph.D. Texas 1955. A study of differential costs as a basis for managerial decisions.

WINSTON OBERG, Ph.D. Mass. Inst. of Technology 1955. Management development: research into three problem areas.

HAROLD E. PADDOCK, Ph.D. Texas 1955. Production waste—its nature and its accounting.

COLIN I. PARK, Ph.D. Chicago 1955. Accounting period theory and analysis.

HARRY V. ROBERTS, Ph.D. Chicago 1955. The role of research in marketing management.

BROADUS E. SAWYER, Ph.D. New York 1955. Influence on accounting by concepts in allied fields.

JAMES S. SCHINDLER, Ph.D. Michigan 1955. Quasi-reorganization and other major accounting adjustments.

WILLIAM E. SCHLENDER, Ph.D. Ohio State 1955. An investigation of certain basic management problems under annual guarantees of employment and wages.

FRANK A. SINGER, D.B.A. Indiana 1955. A summary and evaluation of selected terms of variable usage in financial accounting.

JOHN D. STANLEY, D.B.A. Indiana 1954. An organization and appraisal of published research management problems of informal organizations as it relates to management practice.

WAINO W. SUOJANEN, Ph.D. California 1955. The management factor in the large organization.

RALPH D. SWICK, D.B.A. Indiana 1954. An analysis of cost accounting methods in the Indiana tomato canning industry with proposals for uniformity.

DONALD A. TAYLOR, Ph.D. Michigan 1955. The economic and social significance of certification marks.

AITCHESON B. VAN DER VOORT, Ph.D. Georgetown 1955. Replacement cost depreciation of producers' durable equipment and estimate and analysis thereof.

Theses in Preparation

JOSEPH W. BACHMAN, B.S. Colorado 1948; M.S. Illinois 1953. Responsibility of financial management relating to capital impairment under changing price levels. 1956. *Illinois.*

ALAN CERF, B.S. California 1944; M.B.A. Harvard 1947. Economic implications of inventory valuation methods. 1955. *Stanford.*

JOHN W. COUGHLAN, B.A. Alberta 1948; B. Com. 1949; M.A. Western Ontario 1952. Accounting and changing prices. 1955. *Johns Hopkins.*

DENNIS M. CRITES, B.S. Oklahoma 1947; M.B.A. 1949. Study of the wholesaling market of Oklahoma and surrounding states. 1956. *Indiana.*

GEORGE A. ELGASS, B.B.A. Michigan 1948; M.B.A. 1948. The multi-line firm in relation to competition. 1956. *Michigan.*

ROBERT D. ENTENBERG, B.S. Washington (St. Louis) 1951; M.B.A. 1952. Changing relative position of department stores in United States by merchandise lines. 1956. *Ohio State.*

BENNETT FINLER, B.A. City (New York) 1933. Depletion in theory and practice. 1956. *American.*

GUY G. GORDON, B.A. Washington 1949; M.B.A. 1950. The wholesaling potential of a satellite city. 1956. *California.*

JAMES G. HAUK, B.S. Indiana 1948; M.B.A. 1949. Economic and managerial aspects of product service. 1957. *Michigan.*

RICHARD M. HILL, B.A. Columbia 1948; M.A. 1949. The regularization of retail inventory investment by department stores and departmentalized specialty stores. 1956. *Columbia.*

PAUL HOFFMAN, B.A. New Jersey State Teachers 1938; M.A. Michigan 1943; M.B.A. New York 1948. Manufacturers' brands. 1957. *New York.*

BEN INGERSOLL, B.A. Morehouse 1937; M.A. Atlanta 1938. Some American contributions to accounting thought. 1957. *Catholic.*

RICHARD E. LUNDQUIST, B.B.A. Minnesota 1945; M.A. Northwestern 1948. Quasi-reorganization. 1955. *Minnesota.*

Claude McMillan, B.S. Colorado 1950; M.S. 1953. Management uses of financial standards at base level in the United States Air Force. 1956. *Ohio State.*

Howard E. Morgan, B.S. Wisconsin 1941; M.B.A. California 1952. An analysis of employment income, and retail sales in selected county areas. 1957. *California.*

Henry D. Ostberg, LL.B. New York Law; M.B.A. Ohio State 1952. Functional discounts: legal and economic implications. 1956. *Ohio State.*

Garland C. Owens, B.S. Richmond 1947; M.S. Columbia 1948. Concepts of cost in changes of ownership. 1956. *Columbia.*

John Rivoire, B.S. Cornell 1942; M.B.A. 1948. Penicillin and other antibiotics 1943-1953—an economic analysis of market behavior in a segment of American manufacturing industry. 1956. *Fordham.*

Karl W. Schlubach, B.A. Kentucky 1935; M.B.A. Harvard 1936. DuPont as a growth corporation. 1957. *New York.*

Robert T. Sprouse, B.A. San Diego State 1951; M.B.A. Minnesota 1952. The effect of the concept of the corporation on accounting. 1956. *Minnesota.*

Reed K. Storey, B.S. Utah, 1952. Matching revenues with costs: a reconsideration of the accounting convention of income realization. 1957. *California.*

Weldon J. Taylor, B.S. Brigham Young 1934; B.A. Harvard 1937. A citical analysis of a standard for creating scientific objectives in the study of marketing and the application of such standard to contemporary marketing literature. 1955. *New York.*

Howard L. Timms, B.S. Purdue 1940; M.B.A. Indiana 1953. A philosophy concerning the interrelated nature of business factors in the individual firm. 1955. *Indiana.*

William J. Watkins, B.B.A. Michigan 1948; M.B.A. 1948. Marketing research as applied to retailing. 1957. *Michigan.*

Richards S. Woods, B.A. Rochester 1941; M.B.A. Pennsylvania 1947. Accounting problems in the field of marketing. 1957. *Pennsylvania.*

Raymond J. Ziegler, B.B.A. Toledo 1946; M.B.A. 1948. Management control. 1955. *Florida.*

Industrial Organization; Public Regulation of Business

Degrees Conferred

Thomas V. V. Atwater, Jr., Ph.D. Harvard 1955. Discrimination, competition, and the structure of heterogeneous markets.

Eppes W. Browne, Jr., Ph.D. Harvard 1955. A national rubber policy.

Albert Dudenhoeffer, S.J., Ph.D. St. Louis 1955. The multiple basing point system of delivered price in the Portland cement industry.

Otto Eckstein, Ph.D. Harvard 1955. Benefits and costs: studies in the economics of public works evaluation.

Ronald S. Johnson, Ph.D. Michigan 1955. The marginal approach to public construction of a lakeside levee.

Maurice C. Mackey, Jr., Ph.D. Illinois 1955. Government stimulation of private investment.

David D. Martin, Ph.D. California (Los Angeles) 1955. Section 7 of the Clayton Act in relation to the past and future of corporate mergers.

John Parkany, Ph.D. Columbia 1955. Federal Trade Commission enforcement of Robinson-Patman Act, 1946-1952.

Theses in Preparation

William L. Baldwin, B.A. Duke 1951; M.A. Princeton 1953. Anti-trust enforcement and the financial problems of large firms. 1956. *Princeton.*

LEONARD M. BERKE, B.A. Brooklyn 1940; M.A. George Washington 1948. An appraisal of the effectiveness of the Sherman Act in devestiture of economic control. 1958. *American.*

JAMES G. BLACK, Economics of stockpiling strategic and critical materials. 1955. *Georgetown.*

GILBERT T. BROWN, B.A. Yale 1949; M.A. 1951. The entry of new firms into manufacturing in Connecticut since World War II. 1956. *Yale.*

JOHN S. DYDO, B.A. Columbia 1947; B.S. California 1951. Inter-industry mergers, 1946-1954. 1956. *California.*

BROTHER JOHN GLENNON, B.A. Fordham 1940; M.A. 1949. Cooperative elimination of unfair methods of competition—the trade practice conference procedure of the Federal Trade Commission. 1956. *Fordham.*

BERNARD A. KEMP, B.S. North Carolina 1948. The merger component in the growth of a firm. 1955. *Vanderbilt.*

BOB KITTLESON, B.A. Washington State 1949; M.A. 1950. Certain competitive aspects of the fractional horsepower motor industry. 1956. *Northwestern.*

STEWART M. LEE, B.A. Geneva 1949; M.A. Pittsburgh 1950. Some influences of fair trade practices on certain economic institutions. 1956. *Pittsburgh.*

MOHAMED SAMI MOHAMED, B. of Comm., High Inst. of Finance and Commerce, Cairo (Egypt) 1947; M.B.A. Denver, 1949. Federal regulation of business by the Federal Trade Commission. 1957. *New York.*

HOWARD SCHULTZ, B.S. Xavier 1949; M.A. Cincinnati 1950. Government control in the meat industry. 1956. *Pittsburgh.*

LEWIS E. WAGNER, B.S.C. Iowa 1950; M.A. 1951. An analysis of recent contributions to the theory of industrial organization and market behavior. 1956. *Iowa.*

Public Utilities; Transportation; Communications

Degrees Conferred

JAMES W. BENNETT, JR., Ph.D. Florida 1955. The Railway Labor Act of 1926.

RALPH K. DAVIDSON, Ph.D. Johns Hopkins 1955. Price discrimination in selling gas and electricity.

HERMAN A. ELLIS, D.B.A. Indiana 1954. Southeastern Greyhound Lines—a history of the management and financial policies of a Class 1 intercity motor bus company.

PAUL J. GARFIELD, Ph.D. Wisconsin 1955. Recent developments in Wisconsin public utility regulation.

GILBERT L. GIFFORD, Ph.D. Pennsylvania 1955. The economic aspects of national aviation policy.

CLARENCE H. GILLETT, Ph.D. Chicago 1955. Development of the transcontinental freight rate structure.

ARTHUR L. GREY, JR., Ph.D. California 1954. Financial aspects of the development of urban passenger transportation with special reference to San Francisco, California.

JOHN P. HARDT, Ph.D. Columbia 1955. Economics of Soviet electric power industry.

HUBERT W. HARRIES, Ph.D. Iowa (Ames) 1954. Canadian freight rate control by statute.

JANE KENNEDY, Ph.D. Columbia 1955. U.S. postal rates 1845-1951.

GILBERT MELLIN, Ph.D. Pittsburgh 1955. The Mississippi Shipping Company.

WALTER POLNER, Ph.D. Wisconsin 1954. The development of the railroad system through 1937.

RICHARD W. REED, Ph.D. Clark 1955. Toll roads in the state highway system.

CHARLES E. STONIER, Ph.D. Pennsylvania 1955. The Long Island Railroad—a case study in the problems of public transit.

VIRGINIA G. TAUCHAR, Ph.D. California 1955. Investment in the electric power industry.

WILLIAM WEINER, Ph.D. Columbia 1955. A study of the Hope Natural Gas Company—its historical background and economic significance.

CHARLES WILLIAMS, Ph.D. Pittsburgh 1954. The Pennsylvania Turnpike.

GEORGE W. WILSON, Ph.D. Cornell 1955. Transportation and value theory.

JOSEPH V. YANCE, Ph.D. Harvard 1955. Investment behavior in the railroad industry.

Theses in Preparation

ISAIAH BARD, B.A. Yeshiva 1940; M.A. New York 1952. Section 315 of the Communications Act and the presidential elections of 1952. An inquiry into problems raised by the provisions of Section 315 of the Communications Act of 1934 as evidenced in the use of broadcast facilities during the presidential elections of 1952. *New York.*

RICHARD K. DARR, B.A. Midland 1948; M.A. Nebraska 1952. History of the Nashua and Lowell Railroad. 1955. *Nebraska.*

ROBERT G. DEDERICK, B.A. Harvard 1951; M.A. 1953. The economics of Boston's Metropolitan Transit Authority. 1956. *Harvard.*

EUGENE A. DUBOIS, B.A. St. Johns 1949. The Muscle Shoals controversy. 1956. *New York.*

DONALD V. HARPER, B.S. Illinois 1950. State regulation of motor carriers. 1956. *Illinois.*

JOSEPH R. HARTLEY, B.S. Ball State Teachers, 1953; M.B.A. Indiana 1954. The impact of the St. Lawrence Seaway on the mid-west grain markets. 1956. *Indiana.*

JOHN E. MCGRATH, B.Ph. Chicago 1949; M.B.A. 1950. Piggyback: transportation of trailers on flat cars. 1955. *Indiana.*

JAMES M. PATTERSON, B.S. U.S. Merchant Marine Acad. 1948; M.B.A. Cornell 1954. The subsidy problem in United States transportation. 1957. *Cornell.*

GEORGE B. TULLY, B.S. Pittsburgh 1942; M.B.A. California 1949. Public utility rate regulation under competitive conditions. 1957. *Wisconsin.*

WALTER ZUKOWSHI, M.A. Clark 1949. The Panama Canal. 1956. *Clark.*

Industry Studies

Degrees Conferred

HARRY L. BARRETT, JR., Ph.D. Harvard 1955. Price and output policy in the gypsum industry.

ALVA M. CLUTTS, Ph.D. Texas 1955. A statistical study of the building industry in Texas.

HIRAM S. DAVIS, Ph.D. Pennsylvania 1955. A cross section analysis of variations of capital output in manufacturing—an illustrative study of seven contrasting industries.

JOHANNES H. DELOOR, Ph.D. Columbia 1955. A comparative study of American and South African experience in the manufacturing and selling of Portland cement.

JOHN C. EDDISON, Ph.D. Mass. Inst. of Technology 1955. A case study in industrial development—the growth of the pulp and paper industry in India.

VICTOR R. FUCHS, Ph.D. Columbia 1955. The economics of the fur industry: a study of a highly competitive industry in a less competitive economy.

GEORGE S. GIBB, D.B.A. Harvard 1955. Saco-Lowell shops.

WALTER S. MEASDAY, Ph.D. Mass. Inst. of Technology 1955. The American jeweled watch industry.

KESAV P. PILLAI, Ph.D. New York 1955. The economics of costs and prices in iron and steel industry in the United States and India.

Robert Rosen, Pittsburgh 1955. Management dynamics in the woolen-worsted industry.

Abdus Sattar, Ph.D. Texas 1955. Fiber properties and production of world cottons and their values in merchandising cotton.

Irwin M. Stelzer, Ph.D. Cornell 1954. The cotton textile industry.

Andrew H. Trice, Ph.D. California 1955. California manufacturing branches of national firms, 1899 to 1948.

Theses in Preparation

Bruce Cheek, B.A. Adelaide (Australia) 1947; M.A. 1949. Industry study of the boot and shoe industry in the United States. ***Harvard.***

John L. Enos, B.S. Mass. Inst. Tech. 1949; M.A. Western Reserve 1952. The history of cracking in the petroleum refining industry. 1955. ***Mass. Inst. Tech.***

Edwin Libbin, B.A. Texas 1947; M.B.A. Pennsylvania 1948. Economics of the paper industry in Brazil. 1957. ***Pennsylvania.***

James L. McCarthy, B.S. Massachusetts 1943; M.A. Connecticut 1947. The American copper industry, 1918-1953. 1956. ***Yale.***

Thomas A. Petit, B.A. California 1949; M.B.A. Stanford 1951. The economics of the Douglas fir plywood industry. 1955. ***California.***

Miguel A. Reguero, B.A. New York 1947. A survey of the military airframe industry. 1956. ***New York.***

Hubert E. Risser, Colorado School of Mines 1937. An analysis of the changing structure of the bituminous coal industry. 1956. ***Kansas.***

Tsung-yuen Shen, B.A. Ohio Wesleyan 1952; M.A. Yale 1953. Technology and costs in the cotton textile industry. 1956. ***Yale.***

Sidney Sonenblum, B.A. New York 1948; M.A. Columbia 1951. The role of innovation in the copper industry. 1956. ***Columbia.***

Henry B. Steele, B.A. Rice Inst. 1953. The economic potentiality of synthetic liquid fuel from oil shales. 1956. ***Mass. Inst. of Tech.***

Louis H. Stern, B.S. Illinois 1947; M.A. California (Los Angeles) 1954. The southern California dinnerware industry. A study in location of industry and international trade theory. 1957. ***California. (Los Angeles).***

Land Economics; Agricultural Economics; Economic Geography

Degrees Conferred

James N. Boles, Ph.D. California 1955. Economics of scale for evaporated milk plants in California.

Arthur C. Bowman, Ph.D. Texas 1955. The history and present status of water utilization on the Rio Grande.

Theodore C. Boyden, Ph.D. Harvard 1955. The location of petroleum refining in the United States, 1859-1900.

James O. Bray, Ph.D. Chicago 1955. Agricultural land in a developing economy.

William Cassidy, Ph.D. Pittsburgh 1955. The tri-state non-ferrous mining industry.

Reynold P. Dahl, Ph.D. Minnesota 1954. An economic analysis of the agricultural production lending activities of Minnesota country banks.

William L. Dorries, Ph.D. Texas A. & M. 1955. An appraisal of the Texas Veterans' Land Program.

William M. Drummond, Ph.D. Harvard 1955. Agriculture in Newfoundland.

Irving Dubov, Ph.D. California 1955. The evaporated milk industry in the western region.

Allie C. Felder, Jr., Ph.D. Ohio State 1954. The acceptance of recommended peanut production and marketing practices in Nansemond County, Virginia relative to family organization, family values and relative social and economic status factors.

Darrell F. Fienup, Ph.D. Wisconsin 1955. Price aspects of milk procurement under conditions of imperfect competition.

John L. Fischer, Ph.D. Wisconsin 1955. The economics of co-operative purchasing of farm supplies in Tennessee, with emphasis on the financial aspects.

William A. Frank, Ph.D. Chicago 1955. Costs and returns to farmers from reducing seasonal variability of hog supplies.

Bernard H. Friedman, Ph.D. Pittsburgh 1955. Economic aspects of conservation of natural resources with special reference to soil, water and forests.

Elsayed Gaballah, Ph.D. Wisconsin 1954. The forward price approach to agricultural stabilization.

Karl Gertel, Ph.D. Iowa (Ames) 1954. Economic aspects of irrigation in the western cornbelt fringe with special reference to the proposed Sargent Reclamation Project in central Nebraska.

James C. Gilson, Ph.D. Iowa (Ames) 1954. Optimum livestock production under varying resource and price-cost situations in northeast Iowa—an application of linear programming.

Roland J. Hildreth, Ph.D. Iowa (Ames) 1954. Farmers' investment decisions in relation to time and uncertainty.

Eugene J. Kelley, Ph.D. New York 1955. Location of controlled regional shopping centers.

Masuda Khan, Ph.D. Minnesota 1954. An evaluation of Minnesota farm price index numbers and recommendations for the future.

Ragner L. Kristjanson, Ph.D. Wisconsin 1955. Nonprice factors in milk procurement.

Charles E. Lee, Ph.D. Minnesota 1954. Economic effects of sanitary regulations relating to milk markets.

John R. Lindsay, Ph.D. Harvard 1955. The location of oil refining in the United States.

Travis W. Manning, Ph.D. Minnesota 1954. An analysis of the economic efficiency of Minnesota dairy cooperatives.

Joe A. Martin, Ph.D. Minnesota 1955. The impact of industrialization upon agriculture.

Glynn McBride, Ph.D. Wisconsin 1955. International trade policies and programs with special reference to the dairy industry.

Arthur H. Miller, Ph.D. Wisconsin 1955. Bulk assembling of Wisconsin milk, farm to plant.

Frederick W. Morrissey, Ph.D. California 1955. Price control in the fluid milk industry 1950-1952.

John C. Murdock, Ph.D. Wisconsin 1955. Conservation and the economic theory of depletion of exhausting nonrenewable resources.

Richard R. Newberg, Ph.D. Minnesota 1954. An analysis of changes in hog-cattle price relationships, 1900-1953.

Loris A. Parcher, Ph.D. Texas A. & M. 1955. The use and tenure of land in Oklahoma held primarily for its mineral potential.

Arthur Pynnonen, Ph.D. Wisconsin 1955. Low income in agriculture: a resource use and adjustment problem.

Job K. Savage, Jr., Ph.D. Wisconsin 1955. The effect of non-member patron business on farmer cooperatives.

Albert H. Schaaf, Ph.D. California 1955. An economic analysis of the United States government's mortgage interest rate policy.

Eugene W. Schooler, Ph.D. Harvard 1955. Regional advantage in the production of chemicals from petroleum and natural gas.

Edgar T. Shaudys, Ph.D. Ohio State 1954. A critical analysis of Ohio dairy production cost studies with special emphasis on the farm approach.

Henry K. Shearer, Ph.D. Pennsylvania 1955. The economic effects of the original section of the Pennsylvania Turnpike on adjacent areas.

Gordon R. Sitton, Ph.D. Stanford 1954. California rice farming: a case study in the theory of the firm.

Robert G. F. Spitze, Ph.D. Wisconsin 1954. An analysis of the act as an economic phenomena: the concept of economic power and the problems of agriculture.

Thomas H. Strong, D.P.A. Harvard 1955. Agriculture in relation to balanced economic development in Australia.

Jay P. Swanson, Ph.D. Minnesota 1955. The economic effects of varying amounts of forage on the organization of Minnesota farms.

John W. Thomas, Ph.D. Iowa (Ames) 1954. Timing of conservation returns.

George S. Tolley, Ph.D. Chicago 1955. Earnings of labor and capital in the food processing industries.

Dale H. Weeks, Ph.D. Nebraska 1955. Some economic aspects of electrical power and the Missouri River Basin development.

Egon P. Winter, Ph.D. Wisconsin 1955. The effects of the relocation of a cross-country highway on land values, land transfers and land uses.

Alvin B. Wooten, Ph.D. Texas A. & M. 1955. An economic analysis and appraisal of the wool marketing system in Texas.

Theses in Preparation

Stanley W. Ackley, B.A. Rutgers 1948; M.A. 1950. Industrial trends in the Tennessee Valley region. 1955. *Rutgers.*

Charles H. Berry, B.S. Ag., McGill 1951; M.S. Connecticut 1953. Farm employment 1940-1950—a cross-sectional analysis. *Chicago.*

Charles F. Bortfeld, B.S. Nebraska 1937; M.A. 1939. Recommended shifts in the uses of farm resources in response to certain changes in price relationships of selected farm products in south central Kansas. 1956. *Minnesota.*

Robert C. Brown, B.S. California 1949; M.P.A. Harvard 1952. Local land use planning with particular reference to Butte County, California. *Harvard.*

Gerald A. Carrothers, B. Arch. Manitoba 1948; M. Arch. 1951; M.C.P. Harvard 1953. Techniques of projecting population for urban and regional analysis. 1956. *Mass. Inst. of Tech.*

William E. Christian, Jr., B.S. Mississippi State 1942; M.S. Iowa (Ames) 1947. Impact of industrialization upon the marketing outlets for locally produced farm products. *Chicago.*

George S. Duggar, B.A. Wisconsin 1936; M.A. 1937; M.A. Harvard 1944. The tax structure in a responsible program for housing. 1955. *Harvard.*

Donn K. Haglund, B.A. Drake 1948; M.A. Pennsylvania 1950. The economic geography of the Godthaab, Greenland district. 1957. *Pennsylvania.*

John J. Hughes, Jr., B.A. Boston 1948; M.A. Brown 1951. Determinants of the volume of residential construction. 1957. *Brown.*

Ray S. Kelly, B.A. Williams 1948; M.A. Johns Hopkins 1950. The natural resources of New England. 1955. *Vanderbilt.*

Donald S. Moore, B.S. Oklahoma A. and M. 1938; M.S. 1940. Economic and managerial factors affecting changes in size and organization of a group of southeastern Minnesota farms 1930-1954. 1956. *Minnesota.*

Yair Mundlak, B.S. California 1953. An appraisal of methods of early season crop yield estimates. 1956. *California.*

ROBERT C. OTTE, B.S.A. Nebraska 1947; M.A. 1954. An appraisal of watershed programs in Wisconsin. 1956. *Wisconsin.*

JOHN H. PORTER, B.A. Manchester 1941; M.C.S. Indiana 1947. An economic history of central Indiana from 1790-1820 with special reference to land value. 1956. *Indiana.*

GLEN C. PULVER, B.S. Wisconsin 1951. The economics of livestock production in Wisconsin. 1956. *Wisconsin.*

JAMES RICE, B.S. Pennsylvania 1928; M.L. Pittsburgh 1941. Taxation of mineral deposits. 1956. *Pittsburgh.*

MYRON H. ROSS, M.A. Temple 1947. Economics of parking in center city Philadelphia 1949-1954. 1956. *Pennsylvania.*

ROBERT B. SCHWART, B.S. Ohio State 1947; M.S. 1949. Decision making in corn belt states as related to various knowledge situation. 1956. *Ohio State.*

RAYMOND E. SELTZER, B.S. Illinois 1940; M.S. Kansas State 1942. An analysis of the competitive position of the Los Angeles cattle market. 1956. *California.*

MILES H. SONSTEGAARD, B.S.C. South Dakota 1950; M.S. Denver 1951. The economics of cottonseed products: with special reference to industrial development in Arkansas. 1956. *Oregon.*

GORDON L. SPANGLER, B.A. Tufts 1950; M.A. Fletcher School Law and Diplomacy 1951. Conflicts in U. S. agricultural and trade policies 1933-1955. 1956. *Fletcher School Law and Diplomacy.*

WILLIAM P. STEPHENS, B.S. Tennessee 1948; M.S. 1949. Farm organizations for new irrigation areas in eastern New Mexico. 1956. *Minnesota.*

KYUNHI TCHAH, B. Agr. Tokyo Agr. 1943. Farm labor mobility in Wisconsin. 1956. *Wisconsin.*

LESTER G. TELSER, B.A. Roosevelt 1951. Storage, hedging and the Commodity Credit Corporation. *Chicago.*

WAYNE H. WERNIMONT, B.A. Nebraska 1940. Economic problems related to the Missouri Basin development program. 1956. *American.*

JOHN M. WETMORE, B.A. Kansas 1948; M.A. 1950. The economic effects of the Commodity Credit Corporation on grain marketing. 1956. *Harvard.*

JOSEPH W. WILLETT, B.S. Xavier (Ohio) 1942; B.S. Ag. Kentucky 1950; M.S. Ag. 1951. White and non-white commercial farm operators in the southern states. *Chicago.*

Labor

Degrees Conferred

JOHN W. BALLENTINE, Ph.D. Harvard 1955. Principles of decision-making under collective bargaining.

JOHN M. BROWN, Ph.D. New York 1955. A wage payment plan utilizing statistical principles to provide an incentive for improving the quality of production.

GERHARD BRY, Ph.D. Columbia 1955. Wages in Germany, 1871-1945.

EARL F. CHEIT, Ph.D. Minnesota 1955. A study of some possible incentive effects of workmen's compensation benefits.

A.D. JOSEPH EMERZIAN, Ph.D. New York 1955. A study of the arbitration activities of the Connecticut State Board of Mediation and Arbitration.

HARRY B. ERNST, Ph.D. Harvard 1955. Some applications of industrial production functions.

MERTON W. ERTELL, Ph.D. Chicago 1955. The C.I.O. Industry Council Plan—its background and implications.

CYRIL L. FRANCIS, Ph.D. Wisconsin 1955. Government seizures in labor disputes.

WALTER H. FRANKE, JR., Ph.D. Wisconsin 1955. Employment opportunities of older people.

PAUL V. GRAMBSCH, D.B.A. Indiana 1955. The impact of the Wage Stabilization Board upon management practices and procedures.

H. MURRAY HERLIHY, Ph.D. Chicago 1954. The determinants of the collective bargaining policies of the UAW-CIO in Canada.

DAVID B. JOHNSON, Ph.D. Wisconsin 1955. Labor management relations in the atomic program.

MARK W. LEISERSON, Ph.D. Harvard 1955. Wages in a controlled economy: an analysis of Norwegian wage policy, 1945-53.

ROBERT M. MACDONALD, Ph.D. Yale 1955. Unionism and the wage structure in the United States pulp and paper industry.

JOHN E. MAHER, Ph.D. Harvard 1955. Union, nonunion wage rate differentials.

THOMAS J. MCDERMOTT, Ph.D. Boston 1955. The effectiveness of investigation in the settlement of labor disputes.

JULIUS J. MANSON, Ph.D. Columbia 1955. Problems and standards in labor arbitration: a study of New York state experience.

FREDDIE R. MARSHALL, Ph.D. California 1954. History of labor organization in the south.

MORRIS D. MORRIS, Ph.D. California 1954. A history of the creation of a disciplined labor force in the cotton textile industry of Bombay City, 1851-1951.

JAMES H. MULLEN, Ph.D. Pennsylvania 1955. A study of supervisory attitudes in selected labor markets.

GRADY L. MULLENNIX, Ph.D. Texas 1955. A history of the Texas State Federation of Labor.

OSCAR A. ORNATI, Ph.D. Harvard 1955. Strategies in collective bargaining negotiations.

SHREEKAND ANANDRAO PALEKAR, Ph.D. Harvard 1955. An analysis of real wages in India, 1939-50.

MURRAY E. POLAKOFF, Ph.D. Columbia 1955. The development of the Texas State C.I.O. Council.

ARTHUR R. PORTER, JR., Ph.D. Pennsylvania 1955. Practice of the International Typographical Union.

JOSEPH A. RAFFAELE, Ph.D. Pennsylvania 1955. The structure of clerical wages; an analysis of the structure and changes in office clerical rates in the Philadelphia labor market, 1939 to 1953.

ROBERT K. READY, D.B.A. Harvard 1955. The emergence of leadership in manufacturing work groups.

JANE C. RECORD, Ph.D. California 1954. Ideologies and union leadership: the case of Harry Bridges and Harry Lundeberg.

MURRAY M. ROHMAN, Ph.D. Colorado 1954. The influence of wage stabilization boards on collective bargaining in the steel industry.

ROBERT J. ROSE, Ph.D. Wisconsin 1955. Some effects of seniority in industry.

EDWARD ROSENBAUM, Ph.D. Wisconsin 1954. The expulsion of the International Longshoremen's Association from the American Federation of Labor.

MELVIN ROTHBAUM, Ph.D. Harvard 1955. An interpretation of wage structure changes in France, Italy and the United States from 1938-1952.

EGIL SCHONNING, Ph.D. Toronto 1955. Union-management relations in the pulp and paper industry of Ontario and Quebec.

THERESA A. R. SHAPIRO, Ph.D. Columbia 1955. Occupational mobility and labor supply in the sciences.

ABRAHAM SHUCHMAN, Ph.D. Pennsylvania 1955. Co-determination in Germany.

FRANK L. SIMONETTI, D.B.A. Indiana 1954. Worker restriction of output under collective bargaining in the Ohio rubber industry.

John H. D. Spencer, Ph.D. North Carolina 1954. A study of the male, manual manufacturing labor force of El Paso, Texas, 1952.

Karl H. Stein, Ph.D. New York 1955. Labor codetermination in the Federal Republic of Germany.

James L. Stern, Ph.D. California 1954. The role of the local union: case study of Local 844, UAW-CIO.

(Halsten) John Thorkelson, Ph.D. Wisconsin 1955. Union education programs, 1941-1953.

Ludwig A. Wagner, Ph.D. Columbia 1955. The wage policy of the Swedish trade unions under full employment and full utilization.

Robert E. Weintraub, Ph.D. Chicago 1954. Earning rates of workers from agricultural areas and labor recruited elsewhere in a southern industrial plant.

Samuel M. Wilson, Ph.D. Pennsylvania 1955. The development of work measurement systems in the department of defense.

Theses in Preparation

Gwendolyn J. Bymers, B.S. North Dakota 1948; M.A. California (Los Angeles) 1950. The labor market and seasonal employment problem—women's garment industry in southern California. 1956. *California (Los Angeles).*

Sherrill Cleland, B.A. Oberlin 1949; M.A. Princeton 1951. The influence of plant size on industrial relations. 1955. *Princeton.*

James F. Crawford, B.A. Peru State 1941; M.A. Colorado 1952. Pattern bargaining in the meat-packing industry. 1955. *Wisconsin.*

Demetrios Dertouzos, B.A. Rutgers 1948; M.A. Wisconsin 1949. The Greek trade union movement 1944-1952. 1956. *Rutgers.*

Mary L. Dooley, B.A. Wisconsin 1947; M.A. 1953. The role of government in collective bargaining. 1956. *Wisconsin.*

Frederick T. Downs, B.A. Wisconsin 1947. Impact of rapid growth on a rural labor movement. 1955. *Wisconsin.*

Teresa Feller, B.S. Cornell 1951; M.S. Columbia 1952. The American Federation of Labor and unemployment. 1957. *Columbia.*

Lloyd L. Gallardo, B.A. St. Mary's (California) 1941; M.A. California 1952. The functionalist interpretation of the labor movement. 1956. *California.*

William G. Hosking, B.A. Hobart 1947; M.S. Cornell 1949. Study of short-run wage determination in the construction industry: six labor markets. 1955. *Cornell.*

Wayne E. Howard, B.S. Pennsylvania 1943. The application of seniority provisions in promotion and demotion. 1957. *Pennsylvania.*

George W. James. Stability of the wage share of national and industry income with application of the non-parametric test for trends. 1955. *Georgetown.*

Ralph James, B.A. Oberlin 1950; M.S. Wisconsin 1951. Labor opposition to rationalization of the cotton textile industry in India. 1956. *Cornell.*

Paul V. Johnson, B.S. Purdue 1952; M.S. 1953. Democracy and the decision-making process under collective bargaining. 1955. *Western Reserve.*

Lemuel R. Jordan, B.A. Amherst 1947; M.A. Columbia 1949. Labor force as a factor in industrial location in the southeast. 1956. *North Carolina.*

Paul G. Keat, B.B.A. City (New York) 1949; M.A. Washington (St. Louis) 1950. Changes in occupational wage structure in the wood-using industries. *Chicago.*

Imtiaz A. Khan, B.A. Christian 1950; M.A. Punjab 1952. A study of the mediation of labor disputes in the United States. 1956. *Kansas.*

Robert E. L. Knight, B.A. Harvard 1948. Trends in labor relations within the San Francisco Bay area 1919-1940. 1957. *California.*

John W. Lowe, B.S. Arizona State Teachers 1947; M.S. Wisconsin 1948. Union responsibility in a full employment economy. 1956. *Florida.*

John F. Lubin, B.B.E. New York 1947; M.S. Mass. Inst. of Tech. 1949. Clerical unionization. 1957. *Pennsylvania.*

Leon E. Lunden, B.A. Queen's College 1951; M.A. Wisconsin 1952. Collective bargaining patterns in the Wisconsin automobile parts industry. 1955. *Wisconsin.*

Melvin Lurie, B.A. Pennsylvania State 1948; M.A. Chicago 1951. The effect of unionization on wages in the transit industry. *Chicago.*

Thomas A. Mahoney, B.A. Wabash 1950; M.A. Minnesota 1951. Analysis of some relationships between labor mobility and wage differentials. 1955. *Minnesota.*

Phillip D. McCoury, B.A. Reed 1948; M.A. Duke 1950. Some aspects of pressure group tactics of the operating brotherhoods. 1956. *Duke.*

I. James Pikl, B.A. Wyoming 1949; M.A. 1950. Labor union intervention in product markets. 1955. *Vanderbilt.*

James J. Ridge, O.S.B., B.A. St. Anselm's 1939; M.A. Catholic 1953. The labor policies of Bishop Francis J. Haas. 1957. *Catholic.*

Harold Rosen, B.A. Newark (Rutgers) 1939; M.A. New York State 1942. The utilization of technicians as a means of meeting the current shortage of professional personnel in American industry. 1956. *American.*

Charles Soltis, B.A. Duquesne 1948; M.A. Pittsburgh 1949. Implications of the guaranteed annual wage in the steel industry. 1955. *Pittsburgh.*

R. S. Stockton, B.S. in M.E. Kansas 1945; B.S. in Bus. 1947; M.B.A. Harvard 1950. The influence of wage surveys in wage policies of Ohio manufacturers. 1956. *Ohio.*

Charles W. Uhlinger, B.S. Hofstra 1941; M.A. Columbia 1948. The Wages of seamen. 1956. *Fordham.*

Harcharan Lal Upadhyaya, B.S. Agra (India) 1945; M.A. 1950. Cotton textile wages and working conditions in India. 1956. *Wisconsin.*

Charles W. Vear, B.A. Indiana 1952; M.A. 1952; M.A. Fletcher School Law and Diplomacy 1953. Organized labor and the tariff. 1955. *Fletcher School Law and Diplomacy.*

William D. Wood, B.A. McMaster 1950; M.A. Queens 1953. An analysis of office unionism in Canadian manufacturing industries. 1955. *Princeton.*

Population; Social Welfare and Living Standards

Degrees Conferred

Harry E. Allison, Ph.D. Harvard 1955. An analysis of a consumer panel as a source of demand study data.

David P. Delorme, Ph.D. Texas 1955. A socio-economic study of the Turtle Mountain Band of Chippewa Indians and a critical evaluation of proposals designed to terminate their federal wardship status.

Kenneth W. Masters, Ph.D. Pennsylvania 1955. Population redistribution in the United States, 1840-1860.

Thomas Mayer, Ph.D. Columbia 1953. The population argument of the stagnation thesis in the United States.

Vilas J. Rhodes, Ph.D. Harvard 1955. A theoretical and empirical investigation of consumer preferences for beef by grades in metropolitan St. Louis, 1954.

Thomas C. Sanders, Ph.D. Virginia 1955. Administrative financing and the future growth of the employment security program.

Edward R. Sopiarz, Ph.D. Wisconsin 1955. The level of consumption and the standard of consumption and the consumption function.

Charles J. Zwick, Ph.D. Harvard 1955. A study of the demand for meat.

Theses in Preparation

JOHN A. BOTTOMLEY, B.A. British Columbia 1951. Living standards among the Tanganyika natives. 1956. *Virginia.*

WALTER W. DOTTERWEICH, B.B.A. Upsala 1951; M.A. Pennsylvania 1952. Medical and hospital benefits for the aged. 1956. *Pennsylvania.*

ROBERT W. DVORSKY, B.S. Ohio 1937; M.Ed. 1948. Voluntary health insurance plans. 1956. *Pittsburgh.*

HARVEY N. JOHNSON, B.A. Virginia Union 1937; M.P.A. New York 1947. An analysis of problems and practices involved in the administration of federal public housing legislation by local authority personnel in the United States. 1956. *New York.*

VERNON G. LIPPITT, B.S. Mass. Inst. of Tech. 1938; M.S. 1939; B. Phil. Oxford 1948. Determinants of consumer demand for house furnishings and equipment. 1955. *Harvard.*

MICHAEL S. MARCH, B.A. Colorado 1939. Special veterans' benefits programs and their relationship to the general social security program. *Harvard.*

JONAS E. MITTELMAN, B.S. Buffalo 1952; M.B.A. 1953. The vesting of private pensions 1956. *Pennsylvania.*

BURTON WEISBROD, B.S. Illinois 1951; M.A. Northwestern 1952. The economic value of improvement in public health. 1956. *Northwestern.*

VACANCIES AND APPLICATIONS

The Association is glad to render service to applicants who wish to make known their availability for positions in the field of economics and to administrative officers of colleges and universities and to others who are seeking to fill vacancies.

The officers of the Association take no responsibility for making a selection among the applicants or following up the results. The Secretary's Office will merely afford a central point for clearing inquiries; and the *Review* will publish in this section brief description of vacancies announced and of applications submitted (with necessary editorial changes). Since the Association has no other way of knowing whether or not this section is performing a real service, the Secretary would appreciate receiving notification of appointments made as a result of these announcements. It is optional with those submitting such announcements to publish name and address or to use a key number. Deadlines for the four issues of the *Review* are February 1, May 1, August 1, and November 1.

Communications should be addressed to: The Secretary, American Economic Association, Northwestern, University, Evanston, Illinois.

Vacancies

Private and public finance: Ph.D. with emphasis in private and public finance for a large coeducational Catholic university in the Midwest, beginning in fall, 1955. Prefer man with some institutional and some teaching experience. P170

International travel opportunity: The Council on Student Travel invites applications for short-term employment as educational directors on trans-Atlantic ships. Required: educators from the following fields: cultural anthropology, art history, international relations and economics, group work, language, philosophy, recreation, sociology. Conversational ability in one or more of the following: French, German, Greek, Italian. Ability to organize extensive educational program with the help of passenger volunteers. From March to December, 1955, the program will be conducted by the Council for students, tourists and migrants traveling aboard two large passenger ships belonging to one of the major lines. These ships sail regularly from New York to European and Mediterranean ports. Job assignments vary from one round-trip sailing to periods of 3-5 months. Compensation for these longer periods of service will be regular salary. For a single round-trip sailing, full or partial passage, depending upon job requirements. All positions allow for time abroad. For further information, application form, write to: Council on Student Travel, (0-1), 179 Broadway, New York 7, N.Y. REctor 2-0936.

Business administration: Instructor or assistant professor, small Catholic co-educational college in large metropolitan, midwestern center. Salary four to five thousand depending upon qualifications. Should be able to teach management and general business subjects. Ample opportunity for consultation or other outside work if desired. P175

Positions Available at

American Institute for Economic Research, Great Barrington, Massachusetts

Economic Scientist: For continuing advanced research on money-credit and business cycle problems. Should have some knowledge of National Bureau's as well as our work in this area and a background of research. Ph.D. not required provided record of past achievements satisfactory. Successful applicant could be someone still working on Ph.D. thesis or older man who has had extensive experience in the field. Work includes primarily advanced research, some writing, and some seminar guidance of graduate students; no undergraduate teaching. Salary proportionately better than those usual in academic life, because this position requires continuing work entire year except annual 3-week vacation. Unusual long-run opportunity for professional achievement.

Philosopher Scientist: Must be thoroughly grounded in Pierce-Dewey-Bentley line of advance; preferably some experience in analysis of methods evidenced in work of various economists. Job includes continuing critical analysis and basic reconstruction in economics extending Dewey and Bentley's *Knowing and the Known* into description of economic behavior. Some seminar guidance of graduate students in semantics, logic, and the philosophy of scientific method; no undergraduate teaching. Salary proportionately better than those in academic life, because this position requires continuing work the entire year except annual 3-week vacation. Unusual long-run opportunity for professional achievement.

Investment Division: Man qualified in corporate finance, industry studies, accounting, including ratio anaylsis, and investments for our Investment Division. A mature and experienced individual who might be expected to head this aspect of our work in a year or two is sought. This Division prepares the Institute's *Investment Bulletin* and supervises about 200 accounts of individuals; its work is growing rapidly. Some seminar work with our graduate fellows also would be involved.

Note: We wish to find the best men available for the above positions, which are to be filled either this year or in the summer of 1956. Arrangements will be made for conferences with those selected for final consideration. Please send complete statement of education and experience.

Economists Available for Positions

Industrial surveys, personnel management, market research, international economics: Man, 36, Ph.D. Extensive experience with industry, government, advertising, foreign intelligence; various teaching positions; publications; supervisory, editorial, public relations, and lecturing experience. Several foreign languages. Presently employed in New York City headquarters of an international organization. Interested in more responsible position with industrial, commercial company or large university. E450

Business cycles, economic development, public control, transportation: Man, 36, M.A., Ph.D. Ten years of teaching experience at leading institutions; 5 years in industry. Broad familiarity with manufacturing and transport industries; good publication record. Desires teaching and/or research. E528

Economic principles, labor, economic thought, economic history, economic systems, corporation finance, marketing, money and banking: Man, A.M., Northwestern University. Ph.D., Yale University. Fifteen years of economics teaching experience; government experience as price economist. Broad social science background. Project in American economic field completed. Available in September. E536

Economic history, business history, insurance history: Man, 36, Ph.D., New York University. Fourteen years of governmental experience, including those of an advisory and administrative nature; 1 year of teaching experience. Has considerable counseling experience. Desires research, writing, or teaching position. Interested especially in college or university teaching position. Of especial usefulness to life insurance companies as research assistant or historian. E553

International trade, money and banking, investments, market research, labor economics: Man, married; Ph.D. expected this spring. Three years of university teaching numerous fields in economics; 7 years of government research experience in cost and statistical analysis, interindustry relationships, price studies, and labor relations. Interested in teaching position or opening in private industry in management, sales engineering, or foreign trade. Available immediately. E562

International trade, comparative economic systems, urban land economics, marketing, history of economic thought, public finance, money and banking, economic history of Europe: Man, Ph.D. Research fellowships; 7 years of university and college teaching; 4 years of research in federal government. Experience as consultant; multilinguist; extensive foreign travel. Desires teaching or research position. E563

Economic theory, statistics, accounting, money and banking, private and public finance, mathematical economics, international trade: Man, 35; B.S., M.A., Harvard, plus 2 years of graduate study on economic theory and statistics. Now assistant professor of economics and special lecturer of statistics; 6 years of successful college teaching experience. Other experiences include federal government position, university and industry research. Desires better teaching position or responsible statistical research position. E564

Economic history, history of economic thought, economic theory, money and banking, business cycles, international trade and economics, economic geography, corporation finance, investments, marketing: Man, 30, Ph.D., Rotterdam. Has some teaching, industrial, and marketing experience and excellent references. Desires teaching, research, or advisory position in California (San Francisco area). E565

Investment analysis, auditing, budgeting, business finance: Man, 51, J.D. Twelve years of experience in banking, credit and investment transactions; 5 years of experience in auditing large European organizations; 13 semesters of teaching experience as a professor in a fully accredited university in the U.S. Desires position as an investment analyst, controller, or treasurer. Also interested in teaching position. E572

Beginning economics, economic geography, money and banking, credit, retailing, marketing, public utilities: Man, B.S., M.S., plus year of advanced study. Thirty years of experience in teaching and research work; 28 years of teaching in one institution. Being retired under faculty service ruling. Available for part-time, visiting, or supply instructor. Available in September. E573

Economic principles, money and banking, public finance, corporation finance, investments, business cycles, international economics: Man, 37, single; B.S., M.A., requirements for Ph.D. completed and dissertation in progress. Ten years of business experience in commercial banking and insurance underwriting; 2 years of teaching experience at outstanding midwestern schools; currently chairman of department of economics and business at a leading midwestern college. Desires a change to a better position offering greater opportunities for research and development. Stimulating teacher and public speaker. Partial to Southwest (Arizona) or West Coast location. E574

Business statistics: Man, 44, married; Ph.D. Teaching experience in economics and business administration; publications and convention speaking; active in research and consulting. Now teaching in university. Seeks position with greater responsibility. E576

Economic theory and principles, history of thought, public and private finance, and other subjects: Man, under 40, prewar Ph.D. Experience in banking, research, government. Listed for years in regional *Who's Who;* contributor to leading journals; trade book on economics of baseball just published; several other books in progress, including theory textbook, but stimulating teaching is chief interest and qualification. Taught 18 years at graduate and undergraduate levels, in several fields, mainly economic theory and finance; 12 years as associate professor; 8 years in present position at large university, with tenure. Minimum: full professorship. Available now or will negotiate for near future. E580

Soviet economy, price theory, national income analysis, economic history, international trade: Man, 34, married; Ph.D. Experience: 4 years of engineering in industry, 2 years of interdisciplinary survey research work at large university, 1 year of interindustry research with private corporation, 1 year of teaching. Publications. Interested in teaching-cum-research position. E582

Professional economist and statistician: Man, 42, married; graduate work at University of Chicago but Ph.D. thesis incomplete. Taught 4 years at Ohio State University; 9 years of experience with U.S. government, including OPA and Bureau of the Budget; 2½ years in Economic and Scientific Section, SCAP (Japan). Just returned to U.S. after 7 years in Japan and Far East; last 5 years as founder and director of private economic consulting office in Tokyo, representing various U.S. economic and engineering firms and handling cases for U.S. and Japanese clients involving loans and investments, technical assistance contracts, foreign trade, market surveys, and economic research analysis. Brief economic survey experience for Burma and South Korea. Speaks, reads, and writes German; reads French; fair to good understanding and speaking knowledge of Japanese. At present completing economic consulting assignment for National Planning Association as Japan expert for the Survey of Peacetime Uses of Atomic Energy (to be published). Other writings in field of economic forecasting, national income and expenditure analysis, economic and industrial planning. E583

Labor, finance, theory, doctrines, et al.: Man, married; Ph.D. Forty years as full professor; retired; listed in *Who's Who in America.* Will supply full or part time for one on leave for semester or academic year. E584

THREE TELEPHONE PIONEERS from different sections of the country are Robert C. Price of Williamsport, Pa.; Mrs. Marguerite T. Burns of Minneapolis, Minn.; and Melvin F. Held of St. Louis, Mo. Thousands of telephone people belong to the two Pioneer associations.

They're Telephone Pioneers

Experience and fellowship of long-term telephone men and women are important factors in good telephone service

Robert C. Price, Mrs. Marguerite T. Burns, and Melvin F. Held, shown together here, are Telephone Pioneers.

They are representative of the 180,000 men and women who belong to two big and important organizations in the telephone business. These are the Telephone Pioneers of America and the Independent Telephone Pioneer Association.

These two organizations are composed of employees who have spent many years in the business, their average service being well over 21 years. About one out of every four telephone people in the Bell System and independent telephone companies in the United States and Canada is a Pioneer.

Each day the active, working Telephone Pioneers bring over 3¾ million years of "know-how" and experience to the job. Equally important is their deep-seated spirit of service that is so important a part of the telephone business.

By sustaining and nourishing this spirit, they help to insure its continuance and provide a solid foundation for greater progress to come.

The fast, courteous, low-cost telephone service you enjoy today is due in no small measure to the men and women who wear the proud emblems of the Telephone Pioneers.

BELL TELEPHONE SYSTEM